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Including the Proceedings of the
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME XII DECEMBER 31, 1923 NUMBER 27

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VOLUME XII NEW YORK, DECEMBER 31, 1923 NUMBER 27

The Fastness of Dyes to Light

Reduction and Oxidation—Light—Misleading Statements—Coppering—Testing Fastness—Inaccuracy of Tests—Chemical Tests—Aldehyde—Wall-Paper Fastness—Fastness Depends on Use of Dye—Topping—Necessity of Investigation

[An address by Dr. Wilder D. Bancroft, Professor of Chemistry, Cornell University, and former president of the American Chemical Society, before the Second Annual Meeting of the Synthetic Organic Chemical Manufacturers' Association of the United States, Hotel Commodore, New York City, December 14, 1923.]

AS a chemist I know what the public has been a little slow to learn, and that is that any given dye when pure has the same properties no matter where it is made; that indigo made in the United States is just as fast to light as indigo made in Germany; and that eosine dyes made in Germany are just as fugitive to light as the same eosine dyes made in this country. As a matter of fact, the things that I am going to talk about to-day practically all refer to German dyes, because the literature on dyes in the past has been written mostly in Germany.

And, of course, I also know that you do not need the same standard of fastness under all circumstances; that a ball dress does not need to be as fast to light—it is not exposed to the same amount of light as, for instance, a sailor's uniform. But still we are interested in the question of how fast any given dye is to light, and also whether there is any possibility either of making dyes which shall be faster to light or of taking the same dyes and making them faster to light.

Now, we know that dyes may fade in the light either by reduction or by oxidation. A typical case is Methylene Blue, which you can fade either by reducing it or by oxidizing it. I do not put indigo under that head, because you must have a pretty powerful reducing agent to fade indigo, so that the light does not ordinarily reduce it.

If you look through the literature you will find in general we do not know specifically what wave length, what kind of light, fades any particular dye. Of course, we know this: That it is only those wave lengths which are absorbed by a dye which can have any effect on it. But that is not quite enough, because in general if you take a blue dye you know that it is going to absorb the orange and yellow certainly, and possibly the red; and consequently you would expect it to fade in the orange and yellow.

Now, in at least one particular case—patent blue—there is an absorption band in violet—it is violet light which fades that dye, and not the red or yellow. In other words, when people lay down rules they class patent blue as a yellow dye, because they say it is affected or faded by blue light, meaning violet. It is only a narrow band, but that is the one that is effective. You get the same sort of thing with Fehling's solution, where the band in the extreme violet, or ultraviolet, is very effective, and the others are not.

Now, if you knew in each particular case what light faded any given dye it might be possible to top that dye with something which would not affect the color appreciably but which might increase the stability very markedly. We have two or three instances of that. We should have a great many, but we have not. You will find a statement in Toch's book on paints, which we verified, that if you wash the pigment vermilion over with madder-lake—and I am referring to the pigment, and not to the dye—that that process stabilizes the vermilion so that it does not blacken in the light the way it would ordinarily. That is true. I do not know how long it keeps it, but it does make it very much more stable.

I came across a statement just the other day that the alizarine lakes are less fast than madder lakes—I am now talking about the plant. Unfortunately, the two words come in there. And the statement is made—I do not know whether it is true or not—that purpurine carboxylic acid is the stabilizing substance. If it is, it must be because it absorbs certain wave lengths which are the source of color in the case of alizarine.

Just to show how inaccurate the literature is on

this sort of thing, there is a statement in the literature that a mixture of magenta and chrysaniline is less fast to light than either dye alone. Of course, we got very much interested in that, because we could not see why under the sun it was. If it were so, we would say "catalytic action" and let it go at that. But, gentlemen, I rather like to have some facts occasionally. So we tried it, and it is not so at all. As a matter of fact, a mixture of magenta and chrysaniline is distinctly more fast to light than chrysaniline alone, and it is extremely more fast if you put the magenta on top of the chrysaniline. That is, magenta does protect chrysaniline to some extent from the action of light. Whether or not that is of any interest to anybody, I do not know; but those are merely illustrations of what things are possible if you only knew more about them.

Then, as you all know, there are certain of the dyes which are made a good deal more stable to light by coppering. I cannot find that anybody knows why—whether that is a question of the color of your copper mordant or whether it is something else. It does seem to me that this is the first principle—to find out why it is that coppering certain dyes increases fastness to light, and that coppering does not in other cases. It would not be difficult to find out, if anybody went after it. It is very difficult if you simply sit down and speculate and make guesses, because there are no end of guesses that can be made.

Now, in connection with this we find that all the methods of testing the fastness of dyes to light are hopelessly qualitative; that is, what has been done in the past has been to put things out on the roof and expose them to sunlight for a month. "Sunlight for a month" means one thing in Washington, and in the winter it means something entirely different in Ithaca. And we do not know what exposure we have given. Then, of course, it has been done with exposure to arc light. And then somebody comes along and says, "Let us try exposure to ultraviolet light."

It is perfectly true that ultraviolet light will fade certain dyes fairly rapidly, and therefore it does give an accelerated test; but it may be an entirely false one, because the dye in ordinary use may be faded by red light which one does not get from ultraviolet at all; and, furthermore, the use of the ultraviolet lamp is bad, because that being done in air is always going to make a certain amount of ozone, in which case the dye is being bleached by ozone, whereas in general, under ordinary working conditions, dyes do not bleach in light from ozone. It is not the oxygen which is the active agent and which oxidizes the dye. It is the dye which reduces the oxygen. Of course, that is the difference between tweedledum and tweedledee, if you like; but it is a very important difference if you are going to make your dyes more stable.

Now, as I said before, these tests are qualitative. I doubt whether anybody would be willing to risk comparing two different exposures with any certainty that they are the same. Well, now, that is not necessary, because we have an invention by Mr. Case, in Auburn, who did a great deal of work during the war on signaling with infra-red, and various other things of that sort. He has made a strontium sulphide lamp which, when light falls on it, gives a good electromotive force, and I have seen some of the results he has obtained. This can be calibrated for anything, and he has taken things with the same dye and exposed them one time with a good deal of sunlight and another time until the thing faded to a given point in cloudy weather; and it is perfectly astonishing the accuracy with which those two different exposures agree when you take the total candle-power minutes, or hours, or whatever you like.

In other words, we are in a position now—we were not before the war—to make really quantitative measurements and not simply to confine ourselves to the statement that one hour of a given arc lamp is equivaent to twenty hours of Arizona sunlight, which one reads about in some of the advertisements, and which I have no doubt is true. It is not very accurate and I know it is not accurate in the university laboratory, where the voltage at which the lamp is running may be fluctuating 20 per cent. Yet it might be accurate.

Now, as the light is under ordinary conditions either oxidizing or reducing the dye, that can, of course, be tested out very easily. We have been doing that for our own amusement by putting in an oxidizing agent, let us say dilute hydrogen peroxide, or dilute hydrosulphite, on the other hand, and finding out whether under those conditions your dye bleaches more rapidly or less rapidly. And that works out very nicely indeed. Of course, you must make the solutions dilute enough so that they do not oxidize or reduce the dye in the dark; that is easily done.

And that brings up the question of whether a chemical test cannot be devised for those things; unquestionably, within certain limits, it can. That is, you can unquestionably use hydrogen peroxide or some other oxidizing agent in a great many cases. But all those things, there again, must be gone over very carefully. Here is one thing that knocks the bottom out of it if you go it blind. I have just told you that chrysaniline bleaches very much more rapidly than magenta in light. On the other hand, magenta bleaches very rapidly with hydrogen peroxide, and chrysaniline does not. So, if you took a test of that sort and just went ahead carelessly with it, you would draw entirely wrong conclusions.

Here is another thing that does not affect the people who dye textiles, but it does affect the people who manufacture dyes—that is, this bleach-out process for color photography, where you mix dyes and then expose the mixture to light; and the red light, for instance, is supposed to bleach out the blue dye, and

(*Continued on page* 965)

Proceedings of the American Association of Textile Chemists and Colorists

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THIRD ANNUAL MEETING

SATURDAY MORNING SESSION
December 8, 1923

The Third Annual Meeting of the American Association of Textile Chemists and Colorists convened in the Providence-Biltmore Hotel, Providence, Rhode Island, at 10.15, Professor Louis A. Olney, President, presiding.

President Olney—The first subject on the program this morning is a consideration of "Trade Inspection of Dyed Textiles," and Miles R. Moffatt, of the Amoskeag Manufacturing Company, is going to discuss the phase, "Possibility of Setting Standards of Allowable Variations in Shade in Commercial Deliveries of Textiles." We will hear from Mr. Moffatt at this time. (Applause)

Miles R. Moffatt—Mr. President and Fellow Members: As I understand it, the object of this talk is to discuss whether this Society could do useful work in establishing standards as to shaded and off-shade goods.

We realize that in most every branch of analytical work, for example, there are definite standards. If you were to prepare standard solutions, there would be a certain allowable limit of error. Furthermore, according to the substance you were analyzing, the limit of error would perhaps be more and more closely defined.

In testing a copper ore, two different chemists working on the same ore should get results within perhaps two or three one-hundredths of one per cent. If you were testing a gold ore, the allowable limit of error would be even smaller.

In examining goods produced by the textile industry we know of no such standard of error, you might say. To be sure, there are claim courts in the large cities where differences in judgment between the producer and the customer may be thrashed out before a jury and a decision arrived at, but we know that if one of you says that this is a good match for the standard sample it really doesn't mean very much to any other member of the Society.

This Society has a Research Committee which has busied itself with establishing standards as to the fastness of dyestuffs on dyed material to light and to washing. And wouldn't it be possible for another Committee or for that same Committee to busy itself examining the commercial standards as to allowable variation of textile material from the standard samples and to make some report to this Society as a result of its examination?

As we all know the trade standards at present are variable. We know that at times there is what you call a seller's market, when the larger variations from standard samples as to shade or as to shadedness and off-shade are not so great.

With regard to what the Committee can do if appointed (if it seems agreeable to you to have such a Committee) it seems to me that they could collect a range of shades possibly with the allowable variations from each shade, and possibly they could do some laboratory work in reporting to us what variations in formula would produce similar variations in shade; and they might have some co-operation from those in charge of dyehouses in reporting what their experience has been in variations of formula producing noticeable variations in shade.

For example, you have a weight of material of, say,

400 pounds in one case to be dyed. The next set that goes into the kettle may weigh 408 pounds. If both are dyed with the same formula, does it produce a noticeable variation in shade, and so on?

I hope there will be discussion from some of the gentlemen present as to the feasibility of this plan. (Applause.)

President Olney—We are very glad indeed to have these suggestions as to just what the Association can do for the benefit of the members and for the enlightenment of the industry in general. I think before we discuss this paper, though, we will hear from Walter F. Haskell, of the Dana Warp Mills, who will speak on the subject, "Some Problems Encountered in Inspecting Dyed Yarns in the Dyehouse." Mr. Haskell. (Applause.)

SOME PROBLEMS ENCOUNTERED IN INSPECTING DYED YARNS IN THE DYEHOUSE

By Walter F. Haskell

Dyed cotton yarn considered in relation to cloth in the ordinary cotton mill is still a raw material, not a finished product, and it is as such that I wish to speak briefly of its inspection under actual manufacturing conditions.

In every successful dyehouse there is, of course, not much question about the satisfactory quality of the greater part of the work. There is, unfortunately, always some work which is so bad that the necessity of its inspection is beyond dispute, and then there is very apt to be more or less which is in the twilight zone of doubt and uncertainty.

A correct decision of these cases is important. All redyeing is expensive and many times of doubtful value, and, on the other hand, it is not good business to use imperfectly dyed yarn on a chance and find in the end that the finished cloth is not up to standard, and that a far greater loss has been incurred than the cost of redyeing would have been.

Careful consideration should be given to these doubtful shades. All the available facts about the quality of the stock, the dyestuffs used, the method of their application, the manipulation of the yarn, the method of drying, and all that is known about the use to be made of the yarn, should be brought to bear and if possible focussed in the mind of one person with authority to make a definite final decision.

Let us consider somewhat in detail some aid to correct decisions.

In the first place a suitable pattern or sample of the desired shade should be provided. I suppose that every dyer has had to try to match, for example, such samples as two or three short pieces of rather fine yarn, or a little piece of cloth, say an inch long and a quarter of an inch wide, or a piece of cardboard painted unevenly with water color, or what looked to be a small piece of weather-beaten wooden shingle stained with some sort of paint pretty well faded. I am mentioning some of the samples I have met with and I have no reason to suppose that my experience is at all unique in this particular.

For matching yarns it is very desirable that a standard shade be provided of the same kind and number, and made from the same stock as the batch under consideration and that can be taken to prevent the alteration of these standard shades by careless storage or too frequent handling. This is a difficult proposition with sulphur colors, which many cotton dyers have to use.

It would seem unnecessary to mention that a good light is very essential, but there is a constant tendency around the milk to try to match in a half daylight or a mixture of daylight and electric light, particularly at this time of year.

It is very desirable to view as much of the batch at once as is practical, particularly if there is suspicion of defects of the nature of streakiness or light or dark spots. There are very few dyeings on a large scale that are entirely free from some flaw of this sort, and the acceptance or rejection of the lot many times depends on their number.

The matcher must be careful not to be deceived by the effects of heat used for drying. Many colors are much changed in tone, more or less permanently, by heat, particularly by contact with a heated metallic surface. It is very desirable in examining newly dried warps for evenness to compare only such portions as have had similar opportunity to cool off.

Allowance must be made for change of shade in storing. I have, for instance, never been able to match old dyeings of Indanthrene Blue GCD in light and medium shades. The new dyeings are always greener than the old in our machines. The same is true of beam-dyed sulphur blacks.

A shade which has to stand cross dyeing may seem too far off. The obvious thing to do is to try cross dyeing a swatch in the laboratory. It may be farther off then or it may be nearer. This will give the examiner better grounds for his decision.

It is sometimes found that a warp is "ended" as warp dyers say; that is, the depth of shade runs gradually up or down from one end to the other. It is many times possible by proper handling to bring all the light parts and all the dark parts together in the cloth, so that while there is a variation in depth that may, perhaps, be tolerated only under protest, an intolerable streakiness is avoided.

The use to be made of yarn has, of course, a great deal to do with the strictness of standard of matching. Dyeing warps for cheap shoddy-filled horse blankets is, for instance, a different proposition from making cloth of the type of Palm Beach goods.

In most of the cotton dyehouses with which I have any acquaintance, the attempt is made, particularly with colors which are dyed daily or rather frequently, to produce uniform dyeings by very carefully maintaining uniform conditions. Careful attention is given to all the details of the dyeing process, and no matching is done until the process is finished. Such shades sometimes give the dyer his most puzzling problems. If they come up off shade, shall he believe his eyes or still have faith in his process? He wisely is reluctant to change a well-established formula or process unless there is positive evidence of the necessity of some alteration.

The final test of permissible variation and defects in dyed yarn is the actual results obtained by using it. Sometimes what seem to be serious defects or variations beyond reasonable toleration in the yarn make very little trouble in the final finished product. For instance, there has been some controversy about the degree of evenness of shade obtainable in beam dyeing and other machines of the circulating type. The method of sampling ordinarily employed usually shows a variation between the inside and outside of the beam which for most purposes would be considered not too great. However, these samples many times do not show fully the extremes of variation to be found in different portions of the beams. What may be called the "skin" of the beam both on the outside and next to the barrel is often so dark compared with the samples pulled from the sample holes that no one would think of passing the set or batch except for the roughest sort of work. But during several years of experience with beam dyeing very few seconds have been reported to use in the finished goods which can properly be ascribed to this fact. One is forced to conclude that the apparent serious fault in dyeing is of very little importance after all.

These problems of inspection, of the acceptance or rejection of dyed shades on cotton yarn, the raw material for the desired fabric, call for the application of scientific knowledge as truly as any other problem connected with the dyer's art. They cannot be met successfully by arbitrary methods of any sort.

President Olney—You have heard these interesting papers. There are two points in particular that appeal to me. One is the variation in color matching due to different types of light. We have experimented more or less with different lights at the Lowell Textile School and we have found that even with the daylight lamps a great deal depends upon the constant voltage, that is, maintaining the constant voltage; if the voltage goes up even one or two or drops one or two, you will get a decided difference in the appearance of a fabric in that light.

The other point that appealed to me is in regard to the variation in shade due to the temperature, and, I might add, the moisture in a fabric after it is dyed. A number of us have recently met a condition where an olive drab was dyed with a combination of vat dyes and an Indanthrene Violet or at least a vat violet was introduced into the combination. Depending upon the temperature and the hydroscopic moisture in that fabric, you can have the range from a decidedly red to a decidedly green shade, and the normal condition of temperature and hydroscopic moisture is just about the olive drab that you want; and that same condition, of course, exists in other combinations.

I think there is an opportunity for quite a little discussion on these two papers, and we should be pleased to have you all take part in that as far as time will permit. I simply want you all to remember that we have a set program that we must get through to-day in some way, and I hope you will excuse me if I find in any case that the discussion is taking too much time if I call you to order and suggest that we had better go on to the next paper, and if there is any time left afterward come back to that particular discussion.

Are there any remarks in regard to these two papers we have just had presented?

A. L. Lustig—Referring to the suggestion as to color standards, as to certain standards on dyed fabrics, I feel that perhaps the character of the fabric itself, its value—its intrinsic value—has a great deal to do with the amount of variation allowed. I can see where a silk dyer would have to match a good deal closer than a cotton dyer, and a cotton dyer differently than a man who handles woolen or worsted goods. So it is not difficult, I think, to establish a standard.

Then, it has already been said that the fluctuations in market conditions have considerable bearing on this subject. I don't know whether it is possible to come within percentages. I think the first speaker on the subject referred to a batch of 400 pounds and one of 408 pounds being dyed. I presume it is possible to observe a slight difference of that kind on a fabric that has been treated exactly in the same way, but there are such differences in practical working conditions in preparing fabrics that a batch of 400 pounds one day might dye up perfectly and a different batch of the same number of pounds (the same fabric) might dye up differently on another day. You have different conditions of steam flow, perhaps; the steam may come to the dye baths a little bit differently. The curl on the steam may have something to do with those differences.

I don't believe it is practicable to establish a real standard that we could stand or fall by. It will be allowed by our customers who buy the silk and by the dyers themselves. But in this connection I have a suggestion to offer. Some of the older countries have been investigating this matter and it might be worth while for this Society to get in touch with some of our British

friends, particularly, to see what they have done along this line and what their experience has been, and if they have come to any practicable solution of the problem.

President Olney—Is there anything further to be said in regard to these two papers? We haven't the time to go into great detail, but I presume that most every man here who is connected with a dyehouse could give some experience in regard to discrepancies that arise in the inspection of goods.

P. J. Wood—Mr. Chairman, I don't think that it is possible by human observation to arrive at any standard for passing shades because I believe that the eye of every individual varies somewhat in its observation of colors. We know of people who are color blind and I think that more or less all of our eyes vary in this respect, and I believe the only way that any standard could be arrived at would be by some mechanical means.

The night before last I happened to be coming up on the boat with Mr. Senior, who is the chemist of the Sanford Mills, and he was telling me about the photometer which he had seen in New York the day before. I haven't seen it myself. He showed me a picture of it. With this instrument, by some means or other, you can arrive at a standardization of any color. They have different slides—some of the gentlemen present here may know it. I think it is made or sold by the Palo Company. You can put in two or three different slides and by adjustment of the machine you can state the particular color under observation in terms of these three slides. It is conceivable that a color could be standardized and codified by this means.

I don't think it is at all possible to do it by means of the human eye because I believe half of our customers are color blind anyway (laughter) and I think they get more color blind as the season gets poorer. (Laughter)

The matter of color, I think, is almost as hard to establish as the matter of finish. I say "almost as hard" because, I think, the matter of finish is absolutely impossible to standardize. One man handles a piece and he says, "It is a little too soft"; the next man in the same concern says, "I think it is a little too hard." If you get all their individual opinions, they don't amount to anything. It is more or less arbitrary. The matter of finish is a matter of taste and I think very often the matter of color is.

Another thing that is rather troublesome is the fact of people insisting on absolute matches where absolute matches are not essential. For instance, the second gentleman who spoke—I think it was Mr. Haskell—said that they had had sent to them a piece of goods that looked like an old shingle, very much faded. I don't think that any woman who is going to wear the goods to which this has been matched is ever going to come back and insist on an absolute match or return the goods.

I think there is a great deal too much insistence on absolute matches where absolute matches are not entirely essential. I can quite understand that if it is the object of the manufacturer to imitate a certain fabric and he sends a sample of that fabric, he must have an absolute match if he is to get the same final result in his woven goods. But I think there must be a little "give and take" in these matters and I think there always will have to be. But I really believe that some mechanical means could be devised by which all colors could be standardized and I think this Association should take up the matter. The Research Committee could very well turn their attention to the devising or the finding of some mechanical means of standardization of dyed shades. (Applause)

President Olney—It has been very desirable for a long time to establish such a mechanical means. Of course, a number of different instruments have bee ntried out, and I wonder if it is the Ives Colorimeter that you have in mind. Do you know the name?

P. J. Wood—I don't know, I am sure.

President Olney—It sounds a little bit like it.

Mr. Wood—It is leather bound—I know that.

E. H. Hinckley—The discussion on this subject has brought to my mind some work which we did in 1916 and 1917 at the New Bedford Textile School. I was at that time preparing for the Navy their color vision tests, and I found them very crude. They were of very crude origin, from a dyer's point of view. So before making up the new sets for the Navy—and subsequently the Army sets were based on them also—I started the students in determining what you might call the lumen of color vision; that is, the least amount of color that these students could observe.

It was very interesting from several points of view, but one of the most interesting things brought out was that we are practically all color-blind to a limited extent. I would give the same yellow dyestuff to, say, four different students and they would require entirely different percentages to produce a color on a piece of white cotton—or white wool, I believe we used—that was just perceptible to them. And we had it fixed so they couldn't bluff us much, although they do some, you know. Students always do that. But that was very interesting.

Mr. Wood said everybody's eye varied, and we found that all of these students would easily pass any commercial college's vision test; that is, you would say they had perfect color vision. But when it came to small percentages, the amount of variation was easy to detect, and I think in establishing a standard that you have to go back to something like that. I don't think you can establish a standard, as Mr. Lustig said, on 408 pounds or 400 pounds because of those varying conditions. It seems to me that a standard might be established by basing it on something like the least amount of color that can be seen. I might say we carried these tests

through not only on zero percentage but up to 2½ per cent of certain standard dyestuffs so that we practically went up to Army wool saturated shades, and, of course, the perception of color varied greatly as we went up; that is, at 2½ per cent perception would be reduced one thousandfold sometimes. But it seems to me it could be based on something like that, carrying out some basic tests and then establishing a lumen at certain saturations of color, and using that for a comparison.

That obviates any question of taste and, of course, color is largely a matter of taste as the market selects it, and if a customer selects a certain color within so many lumens it should be a satisfactory delivery.

I think Mr. Busby has all that work at the New Bedford Textile School, and if the Committee took the matter up he would be glad to turn it over to them. He probably has done more on it. (Applause)

President Olney—We will pass on to the next paper, "Dyeing of Olive Drab," by Alan A. Claflin. (Applause)

DYEING OF OLIVE DRAB

By Alan A. Claflin

Mr. Chairman and Fellow-Members of the Textile Chemists' Association: I am a little bit embarrassed at Professor Olney referring to my talk as a paper because I felt, probably erroneously, that I could add a little to its interest by speaking informally, as the subject has so many ramifications and diversifications. And my experience has been so general, rather than definite, that I may make statements which would be better in an informal talk than in a formal paper.

This whole subject of olive drab or uniform cloths is interesting historically, perhaps psychologically. I am speaking of the olive drab essentials from the point of view of a uniform cloth. Uniforms as an established thing for armies probably don't go back much over 200 years. Of course, various individuals who happened to be in charge of various groups of soldiers exercised their ingenuity in decoration from the time of Roman Legions or Alexander the Great, but as so many things in textile coloring go back to Germany, I imagine that some time between the reigns of the grandfather and father of Frederick the Great they evolved our modern idea of uniform cloths.

The first idea with regard to military uniforms was to have something striking and something brilliant. The most familiar example of that, perhaps, is the scarlet coats or the red coats of the British soldiers at the time of the Revolution. It is difficult nowadays to conceive of any people being so stupid as to order forward troops as they did at the Battle of Bunker Hill or the Battle of New Orleans, to come down to a later date, clothed in scarlet coats with white trappings, which is just about the same as the targets we use now for archery practice. They hardly had to wait till they could see the whites of their eyes, in order to hit them at the Battle of Bunker Hill.

After that period of brilliancy in army uniforms, the question came up as to serviceability, and that was the origin of the blue uniform, to a large extent. The demand was for a uniform that would not show the effects of wear and which would stay uniform in every sense of the word. And, of course, the American Civil War, which was one of the first wars in which two very large bodies of men were engaged that called for very large numbers of uniforms, made the demand for Indigo very great. There is always a following of civilian custom after the adoption of a military uniform, and it is entirely conceivable that if it hadn't been for the use of Indigo in dyeing uniforms that the great German synthesis would never have been undertaken.

The synthesis of madder was a German scientific triumph, you might say, over the French because the madder fields of southern France were largely used to color the red trousers of the French Zouaves, and when the German chemists—Grabbe and Liebermann—had put the madder fields out of business and had rendered the German army independent of the madder fields in case they had happened to want to color their trousers red (which they did only to a limited extent), it was a natural thing for them to attack the greater problem of making synthetic Indigo.

But just about the time that they had established their synthesis of Indigo something happened to the uniform business in that the civilized races began to do most of their fighting in the tropics, and in the tropics, for various reasons, the blue woolen uniform was not as practicable as it might be. Adopting Indian practice, the English began to clothe their tropical troops in a sort of nondescript tan color known as khaki. There are many derivations of the word "khaki." There are some 200 dialects in India, so that you can pick and choose as to what "khaki" came from. Some say it came from a word meaning "dried grass" and others say it meant "dust color" and still others say it was just the Indian pronunciation of the word "cartridge," that they associated the English troops with cartridges and in that way they got the word "khaki." So it is really of English origin.

At any rate, in the 90's the idea of a lighter colored and drab uniform began to be popular, and by the time of the English Boor War and our Philippine War the importance of the khaki cotton uniform became recognized.

At that period, the khaki was dyed by the method that had been adopted in England, or as near as it could be. I remember bringing back from England at one time more or less of the secrets of the mineral dyed khaki.

As it was dyed in England it was made with pyrolig-

nite of iron and acetate of chrome. Then this was steamed and treated with a chemic and carbonate of soda, and a very fast color was produced in that way. But in America they had more or less trouble with the proposition from its inception. In the first place, in dyeing this mineral khaki, the use of pyrolignite of iron introduces a variable because there is a difference between a pyrolignite and a true acetate, because the pyrolignite has various empyreumatic color matters which modify the shade which is produced and throw it over greener.

I am not very familiar with how they got along in England, but in the endeavor in this country to get a pyrolignite of iron that would have sufficient coloring matter to reduce the amount of chrome that was required, which was the more expensive ingredient, we would leave considerable tar in the pyroligneous acid, and under certain conditions that would come out in the form of specks on the khaki. And I spent a good deal of my time in this olive drab business in explaining the why and wherefore of tar specks on khaki. But there was a tendency—I am not speaking of very recent mineral dyeing khaki; I don't know what they are doing at the present time—in American manufacturing not to fix the chrome oxide and iron oxide on the fiber by sufficient steaming. In the English process, there was considerable steaming done of the fabric, which had the tendency to fix in the fiber the basic acetates of chrome and iron; whereas in America they hurried the process and used the soda ash before they gave a great deal of steaming, or cut out the steaming altogether, and that resulted in a mere precipitation of the metallic oxides on the fiber rather than the slow deposition that you get from steaming.

But with all that the American khaki was coming along fairly well. However, the Germans who represented the dyestuff interests, or we will say the people who had the coal tar dyestuff interests in their hands at that time, did not look with a great deal of favor on this idea of clothing even our small American army with a fabric which was dyed entirely independent of their great dyestuff factories, and they were troubled perhaps by the superior resistance of the mineral khaki. So a good deal of effort—and there are people in this room who can probably tell more about the details of it than I—was spent in developing a vat dyed khaki, a khaki produced by a combination of the Indanthrene colors, which in many ways was vastly superior to the mineral dyed khaki.

But there was a little nigger in the woodpile, we might say, about even that vat dyed khaki because the mineral dyed khaki would do pretty well, but in order to—I might almost make it as strong as to say in order to—throw out the mineral dyed khaki the American Government was persuaded to adopt a lactic acid perspiration test for uniform cloths. That was put in the specification. I don't know who exactly in the Quartermaster's Department was responsible for requiring lactic acid for perspiration tests, but that was put in: that the goods must stand lactic acid as a perspiration test.

Well, lactic acid has the peculiar effect of dissolving chrome oxide from almost anything so that it threw out the ordinary mineral dyed khaki from consideration for Government purposes for practically all Government cloths.

In order to withstand the lactic acid test the American dyers of khaki had to develop a treatment with silicate of soda. That made the former silicides of iron and chromium which are resistant to the lactic acid, and that did increase the fastness and the weather-proofing probably of the mineral khaki, but on the other hand it so stiffened the fabric that it was unsuitable for most purposes. That form of mineral dyed khaki is only suitable for wagon covers and leggings and tent cloths and that sort of thing, and that is about what it is used for. One particular disadvantage which was found about it was that even if it was softened up there was so much deposition of metallic oxides there that it acted as an abrasive on the needles of the sewing machines and the electric knives that were used in preparing the uniforms. So that it virtually threw out the mineral khaki from consideration for uniform purposes prior to the Great War.

All of you know more about what the Government used for khaki in the Great War than I do, but it was a nondescript proposition of various sorts of sulphur colors, I imagine. But there was also, of course, a great deal of the mineral khaki used at that time, and one of the variations they introduced in America was using a straight acetate of iron and just treating it with soda ash without any steaming. As far as that goes, they could just as well have used copperas and sulphate of chrome as the acetate of iron, that the Government inspectors more or less insisted on.

Anyway, whatever types of dyes went into the Great War, when our troops were caught in their uniforms, the colors were white from washing in the rivers of France.

When we came back to a peace basis this whole matter was brought up by one of the Departments of the Government—I think it was the Marine Department—rejecting American bids on khaki cloth and awarding a contract for a fairly large quantity of olive drab goods to English dyers, who provided the standard English-dyed khaki which as long as it didn't have the silicate of soda treatment was a pretty good fabric for uniform cloths. They rejected the American propositions because the American people had to sell according to specifications, whereas the Englishmen merely sold cloth.

As a result of this reflection on the ability of American dyers to supply uniform cloths for their own army at a reasonable price there was a committee, as you know, appointed by the American Chemical Society and this Society. I don't know exactly who appointed them, and so forth, but they worked in collaboration with the Government in seeing what could be done to provide a more suitable khaki or olive drab process.

I know nothing about the official relations of this Committee and the various people associated with it and, of course, a good deal is unofficial—and I am speaking unofficially—but the consensus of opinion of this Committee was that there were four possible methods of making the olive drab.

As I understand it the Quartermaster's Department didn't specify as a general proposition that there had to be any particular color on this olive drab. What was required was something in the nature of an olive drab that would possess low visibility, which is the modern requirement for uniforms, combined with serviceability, and the sum and substance of it was that there were four methods of producing this.

One is the mineral dye, to which I have referred. Another is the sulphur dye; another is the alizarine dye; and the fourth is the vat dye.

I have advised you at length about the mineral dye with which I have had more particular experience and which perhaps the majority of you have had less experience with. But with regard to the sulphur dye, there are many good sulphur olive drabs available. They have good fastness to washing; they probably can be treated so they will have good fastness to light. But the question of fastness to light is subject to more or less debate; however, I think it is probable that they have sufficient fastness to light for any treatment.

What the Army requires essentially is that a uniform shall be such that you can't tell the length of enlistment of a soldier by the color of the uniform he wears. They would like to have a uniform that is uniform by nature as well as by name.

The sulphur colors, which have the advantage of cheapness have one disadvantage in that they are not fast to chemic or chlorine. Whether the Army can get laundries who don't put bleaching powder or chloride of lime into every one of their solutions, is a question. Of course, there is no particular reason for putting bleach into a laundry which is washing army trousers, but as a matter of fact the recruits very soon learn that their sulphur dyed uniforms are not fast to bleach, so they buy a can of chloride of lime for fifteen cents, and the recruit of two weeks can soon have his trousers looking as if he had been through the Great War. (Laughter)

In regard to the alizarine dyed khaki, nobody has seemed to come forward and "root" very strongly for alizarine, probably because there isn't much money in those dyes at the present time. But at best the alizarine dyes are probably not quite as fast to light as the best sulphur dyes, although I think that one can produce a better average olive drab with alizarine colors than he can with sulphur colors. That is, the average drab made from an alizarine green and alizarine brown would probably be faster to light than the average sulphur dye and it would withstand chemics somewhat better, but it doens't withstand them sufficiently so that there is really any great future in working on that line. Further, it is a troublesome process more or less to dye these alizarines. Dyeing with chrome colors on cotton fabrics is more or less of a lost art. Whether it will be possible to get pretty good results from dyeing chrome colors—in fact, not alizarine, but some of the more modern modifications of alizarine—on cotton, I cannot say; but it hasn't much importance.

Then comes the question of vat dyed fabrics and these, the original vat dyed fabrics— the pre-war ones—were dyed as you know in the fiber. I believe the mixture was an Indanthrene Orange, an Indanthrene Bordeaux and Indanthrene Blue GCD. I have forgotten the exact formula, or proportions.

And that on the whole is probably the best proposition. But on considering the matter, out of obstinacy I wanted to see if there was not a fifth possibility on this thing that would give me a fast O. D. because the various committees and authorities had said there were only four methods by which the thing could be done, and it was repeatedly stated there were only four methods. So I worked on Primuline. I know that the treatment you all use with Primuline, with a chemic, gives a very fast yellow—a faster yellow than is perhaps generally appreciated. Primuline when dyed directly or when developed by diazotization is so fugitive to light that its fastness when treated with chemic is generally overlooked, but my tests have shown that such a yellow is really faster than the Indanthrene Yellow, and after all, yellow is the essential color element in olive drab—a brownish or greenish yellow.

Then the question came up: What black can you put in with the Primuline to develop an O. D. And the first experimenting we did was with Aniline Black. It would seem, Aniline Black being an oxidation product known to be very fast, possible to dye Primuline and Aniline Black together and in that form get an olive drab, but, unfortunately, Aniline Gray, even if you could dye it level, is not fast to chlorine, although developed by oxidation it is fairly fugitive to subsequent treatment with chlorine, and you can bleach off your Aniline Black and leave your brilliant yellow color.

It is possible that you could dye the thing in the fiber and mix, dyeing Aniline Black on a fiber, which, however, makes a rather bad spinning proposition, and then

blend that with the yellow dyed stock, and get a pretty fast O. D. But on the other hand the various vat greens or a certain type of vat greens—Indanthrene Green B, Ponsol Green B, or Anthrene Green B—develop a fast black, Indanthrene Black 2B, when treated with chlorine. So it seemed there was a nice proposition for developing a black to go with a Primuline Yellow, and so I think it has turned out to be.

The only question is on the relative price of your vat green. Of course, that is high now, but that is more or less of a merchandising proposition. As a rule, when the demand increases, the price of that thing increases. I think the demand for vat green would decrease the price because the vat greens are among the simplest—probably next to the simplest—of the vat colors to make. I have always ducked shy of vat colors or even understanding how they were made, their formulas are so formidable. But in looking up this subject I investigated the question of a supply of the Green B in case the process should be adopted, and Green B is simply the amino form of Dark Blue BO. Dark Blue BO is the condensation of benzanthrone. It took me some time to find out what benzanthrone was because it wasn't known when I studied chemistry and I was at first ashamed of that, but I had to look through five books on organic chemistry to find what is known as benzanthrone; but really it is just a condensation product of anthraquinone, and anthraquinone can be made, probably is being made now, in very large quantities from anthracene. So there is surely a possibility of getting an ample supply of Vat Green B.

I have just a few dyeings here which show bleach and light and wash tests on the alizarine dyed and the sulphur dyed khaki and the olive drab and the Primuline Vat Green khaki. As you would expect, the Primuline and Vat Green khaki shows up very well; after fifty hours against the Fadometer lamp it shows no fading at all, whereas the sulphur and the alizarine khakis have gone. With regard to the bleaching test, which was made very severe, you will find that the Primuline and Vat Green withstands the test. While that was a very severe test, it was no more severe than the one that the rookies use. I will be very glad to pass these around, if anybody wishes to see them. (Applause)

President Olney—This talk has been especially interesting to me for one reason, if for no other, because I am a member of the committee of three appointed by the American Chemical Society in regard to olive drab, and we are very anxious, indeed, to get all of the information that we can upon this subject.

Reference was made to the color. While the War Department does not, perhaps, hold the Committee down to exactly this color, this is the one they picked out (exhibiting sample) as being preferable for olive drab color. This is sulphur dyed, to be sure, but they simply wish to get the color.

I would also like to say, although this isn't the place to make a report for the American Chemical Society, that I have here certain specifications as to fastness which are purely tentative that have been drawn up in regard to this, and if any of the men here are especially interested I should be more than pleased to have them look this over and make any criticisms whatever that they feel inclined to make because it will help us a great deal.

I would also say that the perspiration test leaves out lactic acid entirely. (Laughter)

Is there any discussion on this subject? We would like as much discussion as our limited time will permit.

Mr. Carter—I would just like to make a few short remarks.

The remarks with regard to the matter of mineral khaki have been interesting to me, because it was my privilege to see the first samples that were made of mineral khaki by the late Mr. Gatty. That was a good many years ago and Mr. Gatty at that time had just commenced to evolve his process. Originally they did not use pyrolignite of iron but used an acetate of iron made from acetate of lead and sulphate of iron and then they used chrome sulphate for the green property. Before dyeing, the goods were given two caustic boils and two sours, then soaped and given a good hot water wash. They padded in the solution of acetate of iron and sulphate of chrome, dried, and then developed with alkali.

Mr. Claflin referred to the word "khaki," and said its derivation was uncertain. Well, the word "khaki" I may say is Hindustani—used in the Madras presidency. It comes from the word "tamil," which means earth. It is derived in the same way that the Persian word for silk —"abreshum" which means literally shining water—is derived. The adjective of that word is "abareshum."

In regard to the mineral khaki, everybody who has done it has at some time or other had trouble by having uneven pieces which have to be discharged. A very peculiar case in that connection came under my observation years ago. There were some pieces that were uneven; they had to be discharged. The natural thing to do was to sour them with hydrochloric acid. We began to sour these pieces and some would come off, and we had to sour them again and sour them again and sour them again. As a sort of experiment we put a swatch into the lime kier and boiled it; we gave it a lime boil in the kier, and after souring with hydrochloric acid the whole thing came out perfectly. We could never really figure out the reason for that, but that is what it did, and I think in speaking about khaki that is a rather interesting fact to know because everybody is liable to have slip-ups.

Incidentally, Mr. Claflin spoke about the red tunics that the soldiers wore in the early days. The origin of

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that I understand goes back to very, very old times when there were a great number of raw recruits among the soldiers, and they were clad in red tunics so that the blood from wounds would not show and discourage the young men. (Laughter and applause)

W. C. Durfee—I want to explain why those cloths that Mr. Carter referred to were discharged by boiling in the lime kier. After the war we did some of that in our laboratory, and we stripped a number of cloths that had been mordanted with chrome and dyed with vegetable dyes and other dyes.

The fact is that basic chromium absorbs oxygen in the alkaline solution under the effects of heat. In the liquid and with proper boiling and alkaline conditions the chromium base absorbs oxygen and becomes again chromate of lime or chromate of soda and you destroy the basic chromium and reproduce a chromate, which is perfectly soluble in water and washes away and ceases to exist as a part of the mineral khaki itself. And it is very easily done. If you ever want to strip colors from cotton fixed with chrome, you can do it perfectly easily by using bicarbonate of soda and bleach.

I want to add in regard to Mr. Claflin's paper that I don't believe any color that has a chrome basis, alizarine or otherwise, will ever stand bleach on cotton.

(Note.—The account of the morning session will be continued in the next issue of the Proceedings. For various reasons it was felt to be advisable to publish the president's remarks at the banquet before continuing the technical papers.)

EVENING SESSION

Activities Attending the Annual Banquet of the Association

TWO HUNDRED AND THIRTY members and guests of the Association attended the Third Annual Banquet, served in the ballroom of the Providence-Biltmore Hotel. Percival J. Wood presided as toastmaster.

One of the speakers, Hon. Joseph H. Gainer, Mayor of Providence, was compelled to leave early, hence the order of the printed program was deviated from so as to permit him to speak first. Mr. Wood introduced Mayor Gainer in true political fashion as "the next United States Senator from Rhode Island." In speaking to the members Mayor Gainer confined himself to an address of welcome and a eulogy of the textile industry of New England and the conspicuous part played in the development thereof by technically trained chemists and colorists. His remarks were enthusiastically received.

In introducing the next speaker, Prof. Louis A. Olney, President of the Association, Mr. Wood spoke as follows:

Toastmaster Wood—We have before us a treat in the shape of a report from one whom we highly honor, and whom we are highly honored in having with us this evening. We always like to have him at our meetings; we like to have him at our New York Section once in a while. It isn't because he hasn't had the invitation that he doesn't come. I present to you—he needs no introduction—Professor Olney. (Applause.)

Professor Olney—Mr. Toastmaster, guests and fellow members of the American Association of Textile Chemists and Colorists: It has been a twofold pleasure and satisfaction to have been in attendance at this meeting. I have not only received great pleasure from the renewal of acquaintanceship with so many old friends, and the making of new ones, and in listening to so many interesting papers and discussions, but the pleasure of it all, in this particular case, has been greatly intensified by the fact that Providence is my native city and the place where all the years of my boyhood were spent.

Very well do I remember the old railroad depot, as we used to call it, which stood in the middle of the large square directly in front of this hotel, and the Old Cove Basin directly behind the depot, a circular body of water—or perhaps I had better say "of mud"—surrounded by a park with plenty of benches upon which people occasionally sat if they could acclimate themselves to the aroma which came from the water, particularly at low tide. Directly beside the Cove was the old State Prison, and this also made a lasting impression upon me; and I remember as a small boy how, every time I had occasion to pass it, I would speculate as to what the inmates did to entertain themselves, and wonder if what the older people sometimes told me would ever come true—namely, that if I did not behave better I would land there myself some day. But I escaped for two reasons. In the first place they moved the prison away and tore down the building while I was still a small boy, and in the second place I left Providence at a comparatively early age.

All these things have greatly changed since those days, and I wish to congratulate the citizens of Providence upon the headway they have made in improving and beautifying this part of the city, and in more recently adding this hotel, which has given us such a welcome and where we have had every convenience. All this has been a great help indeed in conducting the meetings of our Association.

At this time in behalf of the Association I wish to express our thanks to the Rhode Island Section for their hospitality and our appreciation of the courtesy they have extended in inviting us to meet here. Particularly do we wish to thank the special committee

on arrangements. They certainly knew how to do the job and do it right, and have taken care of even the most minute details.

My friend Mr. Culver, the Chairman of the Rhode Island Section, I think deserves special credit and thanks. He has had this meeting on his mind for months, and has met all kinds of complications, but he has borne up under it all and carried the responsibility well, and I hope that at no time has he become so discouraged as the man I recently heard a story about. (By the way, I got this story over the radio about ten days ago from down in Pennsylvania somewhere, so any of you men who are radio fans may have heard it at the same time.) It was about a German by the name of August Webber, who ran a little delicatessen store and whose business had not been particularly good during the winter. But, as summer approached, he was optimistic and hopeful that the warm weather would bring better business and that he could recoup himself from the losses he had sustained during the winter. He was in this happy frame of mind until the butcher came along one day and said, "August, the price of meat has gone so high, freight and so on, that we must make a raise of 10 per cent on frankfurters and other meat products the first of July." "Well," said August, "I am sorry, but I suppose I will have to pay." That afternoon the baker came along and said, "The prices of flour and yeast have gone up, and other expenses have increased so much that beginning the first of July we shall have to raise the price of frankfurter rolls to 15 cents." "Well," he said, "I am very sorry, but I suppose I will have to pay the price." The next day the milkman came around and said, "We have got to raise the price of milk 2 cents a quart the first of July." Again August replied, "You men are making it hard for me, but I suppose I will have to pay the price." By this time he thought all of the bad news was out, but the next day the landlord came. Said he: "Taxes are very high and the cost of repairs is going up every day. I am very sorry, August, because you have always been a good tenant and have paid your rent promptly, but the first of July I shall have to raise the rent 25 per cent." This time he simply listened but made no reply, and when the landlord had gone he disappeared into the back room with a look of determination. He soon reappeared with a sign which he hung in front of the store directly under his name, and the sign read: "Notice: This year the first of July will be the last of August." (Laughter.)

In associations of this kind it has come to be the custom to expect the President once a year to give a sort of resume of what has been accomplished in the past, and visualize, as well as he may be able to, any plans that may be in mind for the future.

The Association has just finished its second year and, according to the Secretary's report as read this afternoon, we have well toward six hundred members. I have forgotten the exact number, but I think it is within about thirty of six hundred; and one thing which I think is perhaps more interesting, there are twenty-three different States represented in our membership, and several foreign countries. Still more interesting is the fact that there are over 170 different cities and towns which have members in the Association. This means that probably somewhere between two and three hundred different industrial concerns are represented in this Association, because in cities like Providence, Lowell and Lawrence there are in some instances a dozen different concerns which have members in the Association. I want you to fully appreciate the significance of this fact and what an influence we should become in the textile coloring industry for this reason if not for any other.

Our membership is still growing, because at every Council meeting a comparatively large number of members are voted into the Association, and I have no doubt but that eventually we will have at least one thousand members. If it continues to grow as it has in the past, I think we may reach that number even before we anticipate it.

The past two years may well be looked upon as a period of organization. Up to now the officers and Council have been engaged chiefly along constructional lines and the handling of the many matters which have arisen incidental to the launching of such an enterprise.

During this period of time our local sections have become well organized, as you all know. I think that is well demonstrated by what the Rhode Island Section has done for us at this time.

We have published our Year Book, which was looked upon as an experiment, but it seems to have become a permanent thing already, in that we voted to continue it another year, and, in connection with the Year Book, I wish to say that we have planned to make it of greater value next year for the members of the Association and we may call upon you all for assistance later in helping us.

It has been suggested that we publish a complete, or at least as complete a list of American dyes as we can in the next issue, and as much information about them as we are able to do, and shall have to call upon the dyestuff men and others to help out in making this list correct. We realize that we are undertaking considerable of a proposition, and one which is perhaps an experiment, but we hope that if we make it anywhere near complete and accurate that it will prove of considerable value to the members of the Association and also to the textile coloring industry.

The Research Committee, as you know, has been very busy along various lines, but, as was brought out in the discussion to-day, most of their work, up to the present time, has been of a more or less preliminary nature. While we are approaching the point in certain respects where we hope that some of our work can be issued in a final form, it is in all cases still open to revision and criticism, and suggestions are earnestly solicited by the committee, for it is highly desirable that no methods or standards should be put forth for acceptance by other organizations until they are reasonably satisfactory to our members.

Then, in the publication of our Proceedings, I think they have been systematized, and we are reasonably sure in most cases that the reports of our local meetings, and also any communications which are forwarded for publication, will be in the hands of every member within a comparatively short time. The Proceedings have been a great help indeed in binding us all together, although our sections are separated by a great many miles.

We may therefore, I believe, consider that our period of organization is well advanced and that our next period should be one of development. This being the case, I know of no better way to spend the remainder of the time allotted to me this evening than in attempting to visualize some of the lines along which our Association may develop during the next few years.

As I see it, there are two comparatively broad avenues of development which, while they may not run exactly parallel to each other, by no means run in opposite directions.

The first of these avenues is the one which leads more particularly along "descriptive" and "educational" lines, while the second leads toward "standardization" and "research."

Considering first the "educational and descriptive" field, I use these terms because they are almost as inseparable in this connection as are the terms "oxidation and reduction" in the science of chemistry. It is difficult to have one without the other.

The principle involved is simply this: We will say that one member of the Association, whom we will call "A," describes something, some process, some machine, or some particular phase of textile coloring in which he is interested, and "B," another member of the Association, is a listener and he at once becomes educated To-morrow it may be "B" who describes something in which he is interested or in regard to which he has special knowledge and "A" becomes the one who is educated.

There is a very broad field for the application of this principle in the development of our Association; in fact, it would appear to be almost unlimited.

Among our members there are undoubtedly many who may be able to describe something of interest and value to many of the other members. This may be accomplished by presenting a paper or giving a talk before a local section or at the annual meeting. In case a member is so isolated from the textile centers as to be unable to attend any of these meetings he always has the alternative of sending a communication to the Secretary, with the assurance that it will be published in the next issue of the Proceedings.

These talks, papers and communications are bound to lead to discussions, the discussions to new subjects and new thoughts, which eventually lead to more talks and papers, and so the process goes on in a cycle almost ad libitum. The vital point, however, is that each member shall become a party of the first part and be willing to assume the role of educational contributor. We do not need to worry about the parties of the second part. There are always plenty of good listeners. When we ask men to present papers the usual response is, "There isn't anything new that I can give." You must remember that what is old to you may be entirely new to the other man, and that is particularly true in regard to the younger members. The so-called "old stuff," as we express it, may be very interesting indeed to the younger members and may have a very decided educational value. So we should not treat it too lightly, and oftentimes some of the older members of the Association might profit by a little review of some of these "old things," as we call them.

In this connection I would like to impress upon you the importance of one thing that has not developed so far to any extent in our Association: that is, the publication of communications. Whenever I attend the meeting of a local section, as I talk with various ones they oftentimes give me very valuable thoughts that they will not present as a formal paper. If they would only send some of these statements for publication under the heading of a "communication," even though it only occupied a part of a column, inside of about two weeks every other member of the Association would have it and thus interest would be created that might lead to further communication along the same line

As a result of increased activity along the lines I have mentioned, the Proceedings of the Association should become a valuable educational feature of further work and furnish a means of communicating much valuable material to many members who are unable to attend the meetings.

The second avenue of development is along the line of standardization and research. During the coming year there will be no more difficult problem and no

more important problem to engage the attention of the Council and the Research Committee than the future policy of the Association along the lines of standardization and research. Those of us who have given it thought will agree, I think, that there are two vital points in regard to this—first, that the value of the contribution this Association makes in the future to the textile coloring and finishing industries will be measured by the quality, completeness and usefulness of the standardization and research work that may result through the activities of the Council and Research Committee.

In the second place, the Council and Research Committee can make no great headway as to rapidity and quality of work done as long as they have to depend upon the experimental and research work they may be able to do as individuals or through the avenues of the works laboratories which they may direct.

The members of the Council and Research Committee are all very busy men and in most instances their laboratory forces are scarcely sufficient to even attend to their own routine and experimental work. They cannot devote the time that is required for the minute details of carrying out the necessary work of the research committee.

On the other hand, I believe, and when I say this of course I exclude myself, that it would be a difficult matter to bring together a group of men who have a higher standing, scientifically and technically, in the textile coloring industry in this country or who are better able to formulate and direct work of the type which would be most desirable and effective in accomplishing the end sought, than the group who have been gathered together on this Research Committee, which includes a number of men in addition to our own Council. When you consider this for a moment, I think you will see that the Association, in its work and development, has the counsel of a group of men that it would be almost impossible to measure in terms of money or recompense in any way. In every instance they are giving their services to this work, and it has been one of the greatest satisfactions to me as President of this Association to see how these men gather together once a month regularly, sometimes oftener than that, for the Council meetings and oftentimes spend a whole day in traveling and seem to be perfectly pleased and willing to do it for the benefit of the Association.

All of these factors being granted—and I believe that they are—two things are going to be absolutely essential if we would make any great headway along this line.

In the first place, we must have a properly equipped laboratory and place for doing this work. It cannot be done satisfactorily in the works' laboratory, and a number of the members of the Research Committee have made the statement already—that it can never be properly done there, because it interferes very largely with the regular work.

In the second place, if this work would be properly carried on it means something else which is a little more difficult to handle, and that is money, and no small sum either.

The first, I think, is by far the easiest difficulty to contend with, because I have every reason to believe that one of the largest and best equipped laboratories for this purpose in the country woud be available for the use of the Association and at no charge whatever, except perhaps a nominal sum for the use of materials.

When it comes to the second consideration—that of money—it's a different proposition. The question immediately arises: How would the necessary funds be raised? Five to six thousand dollars a year would be a minimum requirement to organize any effective work along the line of research and standardization, and that amount could be increased almost to an unlimited extend, and ten thousand dollars on this sort of work could be very easily used the first year if it was to be put on the most desirable basis.

We cannot hope to obtain this amount through membership dues. The Council is opposed to raising the dues above what they are now, and I agree with them in regard to this. If we raise the dues, I think in many instances we might keep younger men, and some of the most valuable men we could have, from joining the Association. If that's the case, we must look to some other source. I do believe, however, that we have a large number of members who are sufficiently interested and who are able to pay more than the five dollars in the form of an annual sustaining contribution toward this work.

Then, the other sources would be our Corporation Memberships, and I do not think it is impracticable at all to expect a very good return from that source eventually. It is the feeling of the Council—and I fully agree with them on this—that no money should be raised at all except upon the absolute merit of its possibilities, and any proposition that we may put before the industrial concerns must be, as it were, upon a "sold" and "paid for" basis. In this connection I wish to say that anything which suggests begging in any sense of the word is wholly foreign, as I look at it, to the proposition that we have in hand. That is, our work should appeal to the textile manufacturers in such a way that they see real merit and value not only to their own concerns as individual units but to the industry as a whole. And more than that, any money which is paid into the treasury of the Association for

such work should be absolutely without any strings upon it. If the Council should be hampered in any way in this work, it would simply mean disaster to the whole proposition. Perhaps I might make a little clearer what I mean along this line if I say simply this: It has been the experience of several organizations which I have known about and learned about that the men who contribute the largest sums toward work of this nature seldom bother as to the details of what the money is to be used for, and yet, on the other hand, there are instances of concerns contributing, we will say, twenty-five or fifty dollars, who expect to get a return from that through suggesting the work to be done and hope to obtain results for which they would pay several thousand dollars if they went to a firm of consulting chemists. We should not want any such situation as that ever to arise, and therefore I say that any money given to the Association's treasury for the purpose of research, when once given, should be wholly out of the hands of the man who gave it.

I don't mean by that that money should not be accepted for special purposes. That would be perfectly all right; but where that is done it should be accepted by the Council as such, with a very definite understanding as to just how it was to be expended and for what it was to be expended.

With an adequate amount of money for such purposes, several paid men could at once be put upon the work of the Research Committee. We had a discussion the latter part of this morning in regard to possible ways in which the works of the Research Committee could be extended and improved, and I think probably no one in the room realized any better than I did how absolutely impossible it would be for the Council and Research Committee under present conditions to do all of the work that was apparently proposed there. I think if you will simply consider for a moment you will see exactly the situation. Here is this group of busy men; they are excellent advisers and directors of such work, but they cannot spend days or have men working under them paid by their superiors spend days or weeks in carrying out this work for the Association.

I do not know exactly what the attitude of the Council would be in regard to any aggressive attempt to bring this matter before others, but it should be purely on an educational basis and not in any sense merely a campaign to collect money or in any other way secure it, except as I have already said—purely upon the merit of the whole proposition.

Special laboratory work under the supervision of the Council should by no means be the only type of research work to be promoted and encouraged by the Association. This should be at all times supplemented by two distinctive types of work:

1. By generous offers from the research funds of the Association for the satisfactory solution of certain designated problems, and

2. Grants to individuals who present satisfactory and well-defined plans for some special work they wish to pursue.

We made rather a meager start along that first line a year ago when we voted a maximum of one hundred dollars for awards for the solution of problems, and we published a list. Up to this time we have received but one return from that, and as yet that has not been considered or reported on, although it probably will be very soon. I do not know whether the subjects were not sufficiently attractive or whether they were altogether too difficult. However, as I say, we have received very little response along that line as yet, but, as you know, slow beginnings oftentimes have very great endings and this next year may see much improvement.

In regard to the second, of course no funds are available at the present time, but it does not require much imagination to see how the granting of funds to carry out approved work by individuals might become an important and valuable activity of the Association.

To sum up in a very few words what I have said, we never can hope to make any great progress along these lines without sufficient funds to carry on such work, and if the Association is going to successfully develop their work of research and standardization they must meet this problem, and the sooner they do so the better, and I wish you would all think it over seriously.

In bringing my talk to a close I wish to make an appeal to every member of the Association to consider that our success is not a matter of the officers, or of the Council, or of any group of men, but it is going to be measured by the sum total of what the individual contributes in one way or another, and the higher the percentage of members that are contributing to its success—and I don't refer to contributions of money in this case, but contributions along the line of articles, suggestions and various forms of work—the greater will be the success of the Association. I especially appeal to you at this time that if during the coming year you receive certain questionnaires to fill out, that you will consider them seriously and fill them out to the best of your ability and see that they are returned. Even if you can put little or nothing on such questionnaires, it would help us a great deal if you would send them back, because that would at least show your interest and your good feeling toward the Association and its work.

I want again to congratulate the Rhode Island Section. It is very pleasing to look around here to-night and see this large number—I think there is something

toward 250 here. When I think that this growth has all come within two years, I am really amazed, and wonder what our Association will be five years from now if we continue this interest and can impress other people with the value of our work.

Within the last five days the daily papers announced that the Sears-Roebuck Company had offered a comparatively large sum of money toward research work for the benefit of the farmers, and also that a large packing concern in the West had done much the same thing; and you know that one of the large chemical and dyestuff companies within a year has set aside a sum equivalent to $500,000, the income from which is to be used toward the encouragement of chemical research and study.

If these things are true, is it unreasonable to expect that if we can, through our work, properly educate the peole whom it may benefit, we may in some way participate in the expenditure of similar funds and be able to continue our work and do it in the proper manner?

I thank you very much for your attention. (Applause.)

Toastmaster Wood — Gentlemen, Professor Olney struck a true note when he touched upon the subject of co-operation, and its evident growth among our membership. I trust that this spirit of co-operation will increase among us as time goes on, and it would seem, surely, that meetings of this sort, both the scientific meeting we had to-day and the social meeting we are having this evening, should foster such a growth among us.

But let us not put off the doing of the good turn now. There are younger men growing up now in our profession that need our help (I don't pretend to be one of the old birds, but I am not one of the very young ones, either), and I do think that a great deal of help could be proffered, and if it is asked for it can be rendered, by the older men in our Association to the younger men, and I think it will be quite an education for our Junior Sections to be represented at meetings such as this. I have no doubt some of them are here, but let us do it now in the time of this mortal life, because we don't know whether we will have the privilege of doing it in the life hereafter. In fact, we don't know whether we will all be together in one place. (Laughter.) Like the old lady who was reading the ouija board one night, communicating with her departed husband. She said: "Are you happy, John?" He said: "Very happy." She said: "Are you really happy, John?" He said: "I am very, very happy." She said: "Well, how is the climate in heaven?" He said: "I am not in heaven." (Laughter.)

Let us have the spirit of the boy scout—one good turn every day. Let us make that one of the mottoes of our Association—"One good turn every day." Like the boy scout who went to bed the other night; he was tossing and turning because he happened to remember that he hadn't done some good turn that day, and finally a light dawned and he went downstairs and fed his two white mice to the cat. (Laughter.)

The next speaker on the program is Robert H. Newcomb, Executive's Assistant, Boston & Maine Railroad. I had the pleasure of dining with Mr. Newcomb at an informal gathering last evening and can vouch for his ability as a speaker and raconteur.

In his remarks to the diners Mr. Newcomb dwelt at length upon the situation confronting New England railroads to-day, and gave his views concerning remedial legislation which might be adopted.

The evening's program was concluded by an exhibition of sleight-of-hand by Prof. R. Williams, whose efforts were greatly enjoyed by those present. The meeting broke up at 11 o'clock.

COMMUNICATION FROM THE SECRETARY

It has been brought to the attention of the Secretary by several publications that they have had some difficulty in securing papers presented before the Association at its Annual meeting, for publication in their columns.

In order that there may be no misunderstanding in regard to this the following statement from the Secretary may be of some interest and value.

It is customary with many scientific and technical societies that all papers presented at annual meetings, also before local sections are the property of the association and are not to be republished until they have appeared in their official proceedings, unless otherwise released by the officers of such an association.

The Council and Publication Committee of the American Association of Textile Chemists and Colorists have gone into this whole matter very carefully and they believe that this is the best method to pursue in our case, for various reasons, among which perhaps the following are the most important:

In most instances the papers presented by the Association are not news items in any sense of the word, and they will be almost if not quite as valuable to the members of the Association a month after they have been presented as they would have been at the time of presentation. It is therefore thought better to present to every member of the Association with reasonable promptness a complete and correct account of their Proceedings than to depend upon the fragmentary and oftentimes inaccurate reports that may be published by current textile and trade papers.

A considerable portion of the Proceedings of the Annual meeting are published herewith and they will be completed in the next two following numbers of the Proceedings. In this connection it must be remembered that it takes some time to get this material into the proper form for publication, because wherever there are apparent errors or any doubt as to exactly what was said it is only fair that the man who presents the paper or makes the remarks should have an opportunity to revise them if necessary.

We wish also to call attention to the fact that the AMERICAN DYESTUFF REPORTER is merely the agent of the Association in regard to the publication of the Proceedings, and has no choice in the matter of refusing to submit papers for publication by others until they have already appeared in the Proceedings.

(Signed) WALTER E. HADLEY.

COTTON PIECE GOODS BLEACHING*

By JOHN MACADAM, JR.
Joseph Bancroft & Sons Company

In the bleaching of cotton pieces, as in other cotton bleaching, it is necessary, first of all, to have some idea of what the bleach is supposed to do. The impurities in cotton pieces may be divided into two classes. The first of these is the natural impurities, the second is the size or slashing which is added to the warps before weaving.

The natural impurities consist of cotton wax, cotton oil (practically the same as cotton seed oil), pectin, and small amounts of mineral and coloring matter. The added impurities consist largely of starch or dextrine, and a varying amount of tallow or other softening agent. It is the removal, then, of these impurities which is expected of the bleach.

The simplest complete bleach of pieces may be divided into five steps: 1, Singe; 2, Boil; 3, Bleach; 4, Sour; 5, Wash.

The singe has for its object the removal of all of the loose ends of the cotton fibers, threads, cotton linters, etc., and results in a smooth surface which later makes possible the correct finishing of the cloth. It may be of one of three types, open flame, plate, or combination.

The open flame singe consists of passing the cloth through a series of gas burners. This type is used on light-weight cloths such as voiles, where a clear, clean appearance is desired in the finished goods.

The plate singe is used on heavier grades of cloth and consists in passing the clothes rapidly over red hot copper plates. This results in a clean surface at a much greater speed than would be possible in heavy cloth with the flame singe.

The combination is as its name implies a combination of the two first mentioned.

The boil is the second step and has for its object the removal of the natural waxes, oils, pectins and mineral matter from the cotton.

The kiers in which this step is carried out have an interesting story of development. The first kier was a simple wooden tank in which the cloth was placed, and the hot soda liquor ladled over it by hand. The next step was to drain off this liquor and by means of a simple pump return it to the heater from which by gravity it flowed over the cloth again. Finally, with the development in steel work and the added knowledge of textile chemistry, we have the closed pressure steam kier of today. These kiers are heated in one of three ways. They may be heated by open steam, by a closed steam coil, or by a separate steam chest. The liquor is circulated by one of three methods, a steam injector, a pump, either rotary or plunger, or by the more recent vacuum system.

The obtaining of a satisfactory boil requires careful attention to a number of steps. The cloth from the singe house is wet out, soured, washed, and finally wet out with a weak solution of soda. It is then loaded into the kiers. It is in this loading that many of the imperfect bleaches have their beginnings. The cloth must be packed evenly and closely. If the packing fails in either of these particulars the liquor will have a tendency to channel, with the result that some of the cloth is overboiled while other parts are not boiled clean. This is one of the causes of resist stains in dyeing. Also it is important to pack close so that there will be no air retained in the cloth, for it is due largely to the presence of air that the formation of oxycellulose and its resulting tendering may be traced. The treatment in the kiers varies considerably with the class of cloth and the bleacher in charge. The time in the boil is usually about twelve to fourteen hours, and some classes of work require a double boil. The boil is usually carried out at a pressure of from 12 to 15 pounds steam pressure. This corresponds to a temperature of from 115 to 120 deg. Cent. In the soda boil, which is the one most used today, the liquor is about 4 to 4¼ deg. Twad. caustic soda (about 1.8 per cent). In addition to the soda contained,

*A paper presented before the Philadelphia Section of the American Association of Textile Chemists and Colorists on October 4.

some bleachers add various other agents. In this connection we may mention, soap to about 1 per cent, rosin soap from 1 to 2 per cent, mineral oil to about 1 per cent, or Turkey red oil to about one-half of 1 per cent. The volume of this boil liquor must also be carefully regulated. If it is too great it may float some of the cloth, and result in trouble in unloading the kier. If it is insufficient, some of the cloth may dry out and become burned while in the kier.

When the boil is complete care must be taken in removing the cloth from the kier liquor. It is essential that the cloth be thoroughly washed while in the kier, and that they be gradually cooled down while being washed. If not carefully washed, or if cooled too suddenly while still in the liquor, there is a possibility that the pectins removed from the cotton will be reprecipitated on the cloth. In such a case the removal of these products is rather difficult and requires time.

A correct kier boil should have the following results: The cotton should have lost from 5 to 7 per cent in weight; it should show a slight increase in strength, due probably to the partial shrinking and felting of the fibers; and it should show slight shrinkage. In the case of loose yarns this shrinkage will amount to about 2½ per cent, but in the case of pieces this is usually more than compensated for by the stretching to which the cloth is subjected in handling.

One other precaution is necessary to a clean boil. The inside of the kiers must be kept clean. This is usually done by keeping them well coated with lime so that there will be no chance of the cloth taking up iron rust. Such iron rust shows a marked tendency to cause tendering to the cloth in the bleach.

Finally, the materials used in the boil must be of a proper degree of purity. The soda should be pure. It has been shown that the presence of only three-tenths of 1 per cent of sodium chloride or sulphate will result in a decrease of from 12 to 15 per cent in the efficiency of the boil. The water must be reasonably soft. Though the presence of the soda has a tendency to prevent the formation of insoluble soaps, still it may happen and the resulting products are difficult of removal from the cloth. Aside from this consideration, experiments show that a boil with soft water removed about 23 per cent more of the total impurities in cotton than did a similar boil using slightly hard water.

As a summary, then, we may take seven points as the requirements for a good boil: 1, pure materials; 2, proper packing; 3, good circulation of the liquor; 4, absence of air or oxygen; 5, sufficient volume of liquor (about 75 gallons to each 100 pounds of cloth); 6, complete wash immediately after the boil; and 7, clean kiers.

While the bleach proper may be carried out by the use of permanganate of potash or albone (peroxide of hydrogen), I shall deal only with the bleach most used to-day. This is the hypochlorite bleach and may be carried out in any one of several ways. It removes, by oxidation, the natural coloring matter contained in the cotton fibers, and has come into general use because of its efficiency and cheapness.

The bleaching consists in a simple saturation of the cloth by a double dip and squeeze in the hypochlorite liquor of strength about 2 to 2½ deg. Twad. The cloth is then allowed to lie in the oxidation vats for a minimum of three hours, though this time may run considerably over this without harm resulting to the cloth if it kept moist. The result is to remove the natural coloring matter from the cotton. In regard to the strength of the cloth there should be a slight gain rather than any loss.

The hypochlorite liquor was originally formed by the use of calcium hypochlorite, commonly known as bleaching lime. At the present time, however, the sodium salt has almost entirely replaced the calcium, especially in large plants due to the greater cleanliness of the process.

The sodium hypochlorite may be formed by the use of 60 to 65 pounds of soda ash with 100 pounds of bleaching lime, but this method is open to the same objection as is the use of the bleaching lime solution, in that the calcium carbonate remains to be disposed of.

The most used method to-day is by the absorption of liquid chlorine gas in alkaline solution. Three proportions follow:

Water	500 gal.	500 gal.	500 gal.
Soda Ash	350 lbs.	.....	200 lbs.
Caustic Soda	.....	125 lbs.	80 lbs.
Chlorine	100 lbs.	100 lbs.	100 lbs.

In addition to these methods there is the electrolytic method. This is carried out by the electrolysis of a weak solution of sodium chloride. When the process is started some of the chlorine first liberated is driven off. This results in a small amount of metallic sodium being left to react with some of the water, thus forming caustic soda. This caustic soda solution then absorbs the chlorine being liberated, with the formation of the sodium hypochlorite solution, practically as in the use of the liquid gas.

$$NaCl\ (Solution) = Na^{+}\ (Metal) + Cl^{-}\ (Gas)\downarrow$$

$$2Na^{+}\ (Metal) + 2H_2O = 2NaOH + H_2\uparrow (Gas)\uparrow$$

$$2NaOH + Cl_2 = NaOCl + NaCl + H_2O$$

From the above equations it will be seen that the process is continuous. At present, however, it is in use only in smaller installations, especially for laundry work, where a moderate amount of weak solution is required.

The final steps are a sour (acid) treatment with a solution of hydrochloric or sulphuric acid of about 1 to 1¼ deg. Twad., and a thorough washing to remove all traces of the acid.

MEN OF MARK
IN THE
DYESTUFF FIELD

WALTER E. HADLEY
Chief Chemist
The Clark Thread Co.
Newark, N. J.

23115

WALTER EASTMAN HADLEY was born in Lowell, Mass., and attended the public schools of that city.

He completed the Chemistry and Dyeing Course at the Lowell Textile School, and graduated from that institution in the year 1908. After graduation, he remained at the School as Assistant Instructor in the Chemistry Department for a period of four years.

In the Fall of 1912 he left the Lowell Textile School to enter the employ of the Roessler & Hasslacher Chemical Company, being engaged as Research Chemist in the bleaching station of the Perth Amboy Plant of the latter company. This position he resigned, after three and one-half years' service, to enter the employ of the Clark Thread Company as Chief Chemist, which position he holds at the present time.

Mr. Hadley is Secretary of the American Association of Textile Chemists and Colorists, which position he has held since the organization of the Association, and in which capacity he has rendered most loyal and efficient service. He is a member of the American Chemical Society and the New Jersey Chemical Society.

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Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

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WORDS OF WARNING FROM MR. HOOKER

A LETTER from Elon H. Hooker, president of the Manufacturing Chemists' Association, to the Synthetic Organic Chemical Manufacturers' Association on the occasion of the annual meeting of the latter organization, constitutes an editorial which is vastly more potent than any we could pen.

Mr. Hooker's discourse is exceedingly comprehensive. His appeal is patriotic, just and sincere. By logical analysis of international problems, by facts and reasoning based on experience grown out of the war, he strikes a vital note; and this note is one of warning.

He reminds us of *progress* dangerous to American interests—progress in industrial and financial Germany, progress in diplomatic Japan—and progress *here* in America, fostered by concealed hostile groups, as evidenced not only in certain clouded circumstances in the Chemical Foundation case, but also in even more obscure operations in fields other than the chemical industry.

The letter presents a significant thought concisely in the statement, "Should they (Germany) be allowed to win peace through the escape of reparations they will have built up a menace to our industrial welfare in England, France and the United States which is not commonly realized." From this point it is possible to construct a broad argument for immediate action on the reparations situation.

The chemical industry needs more comprehensive dissertations such as this letter from Elon Hooker. It is the sort of appeal that incites earnest thought; it should also incite earnest action. Let us hope that Mr. Hooker broadcasts again words that add "the pugency of patriotism" to a warning not to be ignored.

Mr. Hooker's letter follows:

It is my great regret that an absence from the city makes it impossible for me to greet your association in person. I feel that we have a common bond in the romantic field of research which covers that shadowy borderland between abstract science and industrial achievement, and we follow close behind you in the potential contribution to our country's safety which adds the pungency of patriotism to the natural zest for discovery.

It is but a short time since the war destroyed two hundred and fifty billions of dollars in wealth and resulted in forty million casualties. There is no quick way back to normal, any more than there is to replace overnight the ten million buried dead, but the world is slowly regaining its poise. We move steadily toward permanent peace, but with constant relapses and in the state of nervous expectancy.

Our nation has become great through peace. Germany and Japan have each become great through three successive wars, and France and England, too, in the past, have been far from immune. America has just fought her fight, and now lays down her arms, as the shiftless farmer does his machinery, to rust and decay in the field, showing aversion even to retaining a nucleus of defense. The wanton destruction of Nitro as a chemical, or even an industrial center, is an example. These other nations take a different view, and are keeping their necessary arms burnished and their scientific intelligence keenly alert.

A grave responsibility rests on the chemical industry. A highly developed chemical staff and the far-reaching chemical research necessary to maintain this organic industry (of which dyes are an important part) develops and trains the very experts needed and ready for call in case of need. This is a chemical national guard in constant training.

While vast wealth is being siphoned out of Germany "sperlos versenkt," to give background to the impudent sophistry that Germany cannot pay, they have been placing their chemical industry and general manufacturing plants in an impregnable position for world trade by new construction planned for minimum operating expense, and paid for by the German people, without cost to the companies, through the fall of the mark. Should they be allowed to win the peace through the escape of reparations they will have built up a menace to our industrial welfare in England, France and the United States which is not commonly realized.

For our industrial safety, and especially in our own industry, Germany must be forced to pay from her surplus and current receipts heavily and for a long period of years, otherwise the commercial advantage without overhead, at which she will work, will constitute an insuperable barrier to possible competition. This will result if her internal debt—national, municipal and private, including the bonded indebtedness of her industrial plants—is wiped out by the fall of the mark and reparations are escaped.

It is our first concern that the reparation be paid, and here, for the second time, France alone stands in the breach, as at Verdun. From what group of Germany's population these reparations are paid, or

whether from sequestered wealth, fixed assets or current earnings of all the people, is only a secondary issue.

If Germany, with sixty million people, taxes herself at the present rate of French taxes on France's forty million people, Germany will have a present income of thirty-three billion French francs yearly, as against France's present income of twenty-one billion francs.

Carrying out the terms of the Versailles Treaty, Germany can maintain her administrative government on the same relative basis that France is now maintaining hers and yet pay three-quarters of her income, or one and one-half billions of dollars, per year in reparations. This could be made to pay the total reparations asked in less than twenty-five years. The funding of the British war debt to us will result in a charge on the British people for sixty-two years, and there is no reason why the duration of the burden on Germany should be any shorter.

Turning to the Pacific, we must not forget that the principal Japanese naval depot was left intact by the earthquake and that only a small proportion of their fleet was destroyed, nor that they had started hoarding oil for a future five-year war.

The Japanese have always believed in acquisition of territory and personal exploitation. We stand for equal opportunity to all and the open door. These policies are antithetical, and one or the other must gradually or abruptly give way in the East.

There is reason to believe from the atttack on the Chemical Foundation and significant incidents picked up at random in the day's work, that there is a suspicious trend toward German infiltration in our chemical industry.

I was present at a business meeting recently where it was definitely proposed that a one hundred per cent American corporation should enter into direct partnership with a German bank in the exploitation of German processes in this country, on the ground that we would make money for ourselves and for the German.

It has been said that science has no national boundaries. Whatever may be the habits of science, it is at least a fair statement that common decency keeps close to the home fireside, and does not deal with those who defy every law of business and international morality.

Attempts are under way, of specious plausibility, to turn the fine edge of American honor by unworthy appeals to our commercial sense, like those unforgotten appeals to keep us out of the war long after we should have gone in. Let us not forget that the after view showed a painful piling up of national debt and a lost opportunity to assert the fine temper of American tradition.

America has been overindulgent to foreign nations in her immigration, and has racial indigestion. She has need of putting her own house in order for many years to come. Let us turn then to our domestic housekeeping, direct our eyes homeward from abroad, stand loyal to this country, especially in that chemical industry so vital to our national defense, and keep burning the vestal light which illuminates our highest American traditions.

PAPER HATS FURNISH COUNTER PROPAGANDA

AT the dinner of the Salesmen's Association of the Chemical Industry, held at the Builders' Club, December 21th, an amusing incident occurred which, if regarded in a more or less serious aspect, serves to illustrate the fallacy of the widespread public belief that all German dyes are fast.

The diners at this affair wore brightly colored paper hats. During the latter part of the evening, as the crowd grew gayer, the effects of surplus sales energy began to show on the foreheads of the more lively; glistening trickles of dewy perspiration oozed out beneath the edges of their paper hats and dribbled over their faces. One stout, baldheaded gentleman, after acknowledging a Christmas gift, bowed and doffed his hat. The other diners beheld upon the shining expanse of his damp scalp what at first appeared to be a brilliant futuristic painting. Flamboyant streaks of mauve, orange and blue were spread over his forehead, radiant in the light.

From the throng around the tables came roars of laughter, but the hilarity suddenly mounted when it was discovered that the brow of many another was streaked and daubed in like manner. The perspiration had caused the dyes in the paper hats to "run."

The stout gentleman jeered derisively across the table. "That's your Fast Blue B Extra, Jenkins," he said, pointing to his ornamented brow, "*extremely* fast!" One by one the others took up the taunt; somebody's Auramine was accused; somebody else's Blue R, another's Chrysophenine or Safranine..

Jenkins suggested that inquiries be made as to the manufacturer of the paper hats. A pasteboard box was brought in. It was labeled "Made in Germany."

Germany has back of her a well-established and world-wide reputation for the excellence, the dependability and the quality of her dyes. This reputation has become traditional. To question it would, not long ago, have been on a par with certain forms of heresy. But it has been an effective blinder to actual conditions.

In dyes, as we know, are countless degrees of fastness. The mere label "German" or "American" on a dye is no guarantee of its fastness. A majority of the deprecatory remarks concerning *American-made* colors are unfounded. Doubtless the origin of many of the inferior dyes that give impetus to the slurs on American products could be traced directly to another country. There are dyes and dyes, but no matter what *country* produces them, their fastness depends upon their chemical construction.

T. C.'S COLUMM

WHO KNOWS ANYTHING ABOUT TEXTILES?

Who knows anything about textiles? And who can expect to in a normal lifetime?

Just listen to this—and it is right from our good authority, the AMERICAN DYESTUFF REPORTER, of no later than April 9, A. D. 1923. (No, the editor did not write it.) "While it is true that the mechanical phase of textile manufacture is highly developed, the opposite is true of the equally important chemical phase of the processes." Certainly a thought-provoking morsel for members of the A. A. T. C. C.

Another equally striking thought came from one of the leading engineers in the industry, one whose original work in the physics and mechanics of the textile fibers is second to none. His view is quite the opposite, that while the chemical side is well understood, there is still an enormous amount of research work to be done before we can really understand the manipulation of the fibers themselves.

Having pondered over these matters at some length and tried, partly in vain, to promote a desire and respect for textile research at different mills, I am inclined to think that both are wrong and that both are right. They are both mistaken in thinking that the other fellow has his problems well in hand, while they are correct in recognizing the deficiencies in their own fields. There is still plenty to be done in both directions, and this leads us automatically to research.

Although research is not our present subject, a few words hinting at fields still unknown will do no harm. To realize the things that are yet to be learned about the textile fibers as such, one needs only to glance through a few back numbers of the Journal of the Textile Institute and notice the fundamental subjects that are being reviewed or investigated. Gaps in our knowledge are the most prominent features.

To realize what we ourselves do not know about our daily tasks we have but to think up a few questions. Many operators have worked out to their own satisfaction the conditions most favorable to good mercerization. They can tell us how to mercerize, but still who can tell even yet just how caustic mercerizes cotton?

Who has anything approaching an explanation of finishing? At best it is little more than cut and try, especially where foreign materials are applied to the goods. Starches and oils and fillers are mixed in the most fantastic fashion, but a cotton finisher seems to be able to tell the difference if any ingredient is appreciably changed. Will the subtleties of "feel" ever succumb to standard methods?

One can think of questions enough. Why do some dyes color cotton and others not? In fact, why do dyes dye at all? There are any number of these fundamental processes that will only be understood as the properties of the colloidal state are understood. In other words, when knowledge is sufficient.

Now for the many puzzling things in everyday work. Perhaps most puzzling of all is that the things that will work in one place will not work in another. This is often sad but true, and there is a reason for everything that does not work, just as there is one for everything that does. The reason may be understood but probably more often it is not.

The variety and conflicts in both practice and opinions are almost unbelievable until one has a problem that brings them out. Perhaps this will appear most clearly when there is difficulty in some process and you attempt to find out why by consulting the experiences of others.

Take the simple matter of Sulphur Black. Opinions vary on the length of time that an idle standing bath can be kept before it goes "bad" beyond rejuvenation. They not only vary, but run all the way from three or four days to an indefinite period, possibly as long as two or three months. The time does, no doubt, vary with circumstances, but not as widely as these opinions. Here is a lack not only of definite, but even of approximate knowledge. The gap could be filled by collecting the results of experiences in different plants, and an average established for some fairly definite conditions. When this length of time had been reached, a person could go very gingerly about the task of bringing the dye bath back to life and possibly save himself much trouble.

Inquiry for good combinations of dyes, say for artificial silk, will bring different dyes from different firms, not only different names, but actually different types, as being best for the same purpose.

Some claim that caustic soda should not be used for the best kier boiling of yarns, others that only caustic should be used, and not even soda or kier oil with it. Opinions, and I dare say practice, are exactly opposite.

"Essential" things, so-called, are often quite unnecessary. Most of us have seen men declare almost on oath that certain "drugs" were essential for certain purposes, only to discover that when left out by accident the secret of success was never missed.

Meetings of technical societies, and the pages of scientific, technical and trade papers, are leading in the struggle toward standards in the testing of materials and reasonable uniformity in the methods of using them, but the more we study into the intricacies of any branch of textile manufacturing, the more often we come back to our question, "Who knows anything about textiles?" We on the chemical side know many things that are true, and a great many things that are not true. However, we all have a private yearning for more real knowledge, and if we want it badly enough, we, collectively, can find ways to get it.

T. C.

FASTNESS OF DYES TO LIGHT

(*Continued from page* 936)

consequently leaves the red dye. Now, some very curious things happen which nobody knows anything about at present. You want to make those dyes sensitive to light and then afterwards, of course, treat them so that they are permanent. In order to make them more sensitive the natural thing would be to add a distinct oxidizing agent, and hydrogen peroxide would be the natural thing to add. That has been done, and it does make them more fugitive to light; but it does not make them nearly as fugitive to light as certain other things which can be added—which, curiously enough, are nearly all aldehydes.

Now, aldehyde is a reducing agent, and yet when certain aldehydes are added in this bleach-out process they make the light oxidize those dyes faster than if they were not there; why, I do not know. I can make a guess. I think the chances are that if we studied that, we would find that half the oxygen goes to the aldehyde and the other half goes to the dye. But I do not know that, and nobody else knows that. People are so interested in trying to find a combination which will give them a commercial process for making color prints that nobody has taken the trouble to find out why a thing like different aldehydes should be ever so much more effective than oxidizing agents, although in our present state of scientific knowledge people ought not to be. Personally, I feel that it is a mistake; that if they knew just why those particular things worked better they might be able to devise something else which would be even more effective.

Our organic chemistry on this subject is singularly inadequate. For instance, there is a statement in the books that monochromatic light, whereby they mean ultraviolet, I think, bleaches Methylene Blue reversibly and that ordinary light bleaches it irreversibly—or maybe the other way round. Now, I have also found a check on that chemically. That is, there is a statement which we have not tested that Methylene Blue can be bleached by hydrogen peroxide reversibly, and by reduction you can bring it back. If you bleach it with ozone you cannot bring it back.

I have asked the various organic chemists I know, men in the universities and men like Clarke of the Eastman Kodak Company, and not one of them has the remotest idea what the oxidation product is in either case. They do not know whether, when you bleach with ozone, you go through the stage which you go through by bleaching with hydrogen peroxide and carry it further, or whether it goes off on an entirely different tack. That, however, to a person who is interested in the scientific side of it does seem important.

Then, if you go back—oh, just to avoid any hard feelings let us go back twenty-five years, so the question of American-made dyes does not come in at all, and get away from textiles and take wall papers for a moment. Twenty-five years ago, especially if you lived in a small town as I did, you could not buy a wall paper which made any pretense of being fast to light. They all faded in a very few years. If you went to New York or Boston you could buy an English wall paper, or certain English wall papers, which cost more, of course, and which were pretty fairly stable to light. And you could import from Japan grass cloth papers which were practically, I may say absolutely, stable to light. I have seen some of those Japanese grass cloth papers which have been exposed in a summer place near the seashore—lots of sunlight and salt air and all the disadvantageous things—for twenty-five years; and I would not want to say, of course, that they had not faded at all, but you cannot see any signs of fading.

Now, I do not know yet whether that is because the Japanese were using better dyes than the English were, or the Americans were, in their home-made paper, or whether it is the peculiar nature of the grass cloth—that is, that the dyes were faster on grass cloth than they were on ordinary paper. There again, that is the thing we ought to know.

I have jotted down a number of things just to show the way in which different dyes have very different fastness to light, depending on the way you use them. There is a statement that albumin lakes are four times as fast as barium lakes. Now, my guess there again is that albumin probably acts as a reducing agent to a certain extent and cuts down the oxidation. But I do not know. Another statement is that barium-tannin lakes are very much faster to light than straight barium lakes. There again I imagine it is because the tannin gets oxidized.

Then you run up against this statement: That most dyes on an inert base like a barium-sulphate base, or any of the others, are more fugitive to light than they are when you have them in the mass. On the other hand, an alizarine lake is very much faster to light than straight alizarine.

Then you get this statement: Paranitraniline Red is faster on cotton than on wool; indigo is faster on wool than on cotton. Both good things to know. Methylene Blue is faster on cotton, presumably mordanted—although they do not say so—than on wool. Magenta is not. Magenta is the other way round.

I got into town early, so I stopped at the Chemists' Club and went up and looked at some of the books there and found a statement which I had not had in my notes, that Methylene Blue is very fugitive to light on acetate silk—much more so than it is on cotton. That, on the other hand, magenta and Malachite Green crystals and Brilliant Green are surprisingly fast on acetate silks—that is, very much faster than they are under ordinary conditions. Again, one would like to know why.

Then you have the further statement that substan-

tive dyes are faster on wool than on cotton. That alizarine blacks are faster on chrome—faster to light, not to washing—and not on alumina, tin or iron.

Of course, one obvious fact at first is that alumina and tin are colorless, and might let through certain wave lengths which are stopped by chrome; but, on the other hand, the iron is colored.

Then, logwood is faster with iron than it is with alumina, and quercitron—which I do not know if anybody uses now—is faster on alumina than on tin.

I could not lay my hands on the reference before I came down, so I am not quite sure just which way it is—but it is stated that there is a very distinct difference in the fastness to light of pale and deep shades of indigo. Now, personally I do not feel any certainty that that is true. It may perfectly well be that a slight fading makes a lot of difference on a pale shade and yet a very small percentage of difference on a dark shade; or it may be, on the other hand, that indigo which is in intimate contact with your fabric, your fiber rather, is faster or less fast to light, as you prefer, than the deeper shades where you have the same indigo dye.

As I said, I am not quite sure which way the thing goes, because I could not find that reference. But people put all those things in literature, and some of them at least we have checked and I know are true. But there is absolutely no knowledge as to why these things act as they do. And yet that seems to me in certain respects fundamental.

I am just simply suggesting one possible thing as regards improving these conditions—that you might put something else on the dyes—top them with something—which would cut out the light which does the business. But then you come back again; and why is one thing faster on cotton than on wool, and why is the other dye—all a case of oxidation, probably—faster on wool than it is on cotton? And you cannot translate that information, or may not be able to translate that information directly into dollars and cents.

But I do not see how you are going to go ahead and improve things and either make better dyes or improve the application of your existing dyes until you know why cotton acts one way with one dye and wool with another, or why eosine is faster on a lead base, while, on the other hand, most of these things on a barium base are much less fast.

In other words, we do not know the first thing in regard to the behavior or the action of light on dyes. That is, we have got a lot of empirical data. Now, empirical data are good as a starting point, but they do not get you anywhere; and the reason we haven't anything more than empirical data is chiefly that a lot of people have gone at it as if the action of light on dyes was a perfectly mysterious thing. And my experience is that the man who is looking for mysteries finds them. And I am quite certain that if you will go at this thing systematically you could clear the whole thing up in a relatively short time, and certainly, from the side of the man who is interested in the scientific development, I hope you will some day.

Recent Patents

Fabric-Treating Machine

October 9, 1923; 1,469,765)

RAYMOND F. BACON, of New York, CLEO H. KIDWELL, of New Brighton, New York, and PERRY H. BASCOM, of Boundbrook, New Jersey, assignors, by mesne assignments, to Van Heusen Products, Inc.

This invention relates to a machine adapted to treat woven fabrics of any weight or weave, and particularly heavy tightly woven fabrics, it being provided with means for forcing or drawing the solution through the fabric. According to the preferred embodiment of the invention the entire fabric is not treated but only certain portions thereof, the said treated portions being spaced at any desired distance along the strip of fabric.

Following is a brief description of the details which will be discussed hereinafter in connection with the drawings.

In the operation of the machine, the fabric is drawn by the rollers between the platen and bed plate while the platen is raised. When the desired length of fabric has been pulled through the driven roller stops, thus leaving the fabric suspended between the rollers at each end of the machine and at the center of the machine lying in a flat strip between the platen and bed plate. The platen then moves down and presses the fabric firmly between its lower face and the upper face of the bed plate. Immediately a suction is produced by the evacuated chamber under the bed plate and the solution passes through the pervious material of the platen, through the fabric which is pressed between the members, through the pervious material of the lower jaw, and into the chamber. The fabric is thus completely saturated with the solution at that portion thereof which lies between the pervious faces of the bed plate and platen. It will be obvious that the entire lower face of the platen and the entire upper face of the bed plate may be made of pervious material or only those portions thereof desired, depending on whether all or only a certain part of the fabric between the members is to be treated.

When enough solution has been drawn through the fabric to treat it thoroughly, the platen moves upward, thus breaking off the suction of the bed plate and chamber and stopping the flow of acid. Also the fabric is now released from its position between the members and the driven roller begins to operate and draws the fabric through to the next portion which it is desired to treat. The operation is then repeated for each successive treatment of the fabric.

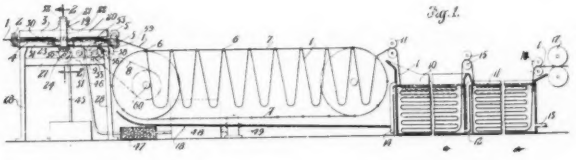
The invention will be further described in connection with the accompanying drawings illustrative of one embodiment thereof, in which:

Fig. 1 is a side elevation showing diagrammatically the entire apparatus.

Fig. 2 is a sectional elevation taken along the line 2—2 of Fig. 1.

Similar numerals refer to similar parts throughout the two views.

The entire apparatus of the preferred embodiment of

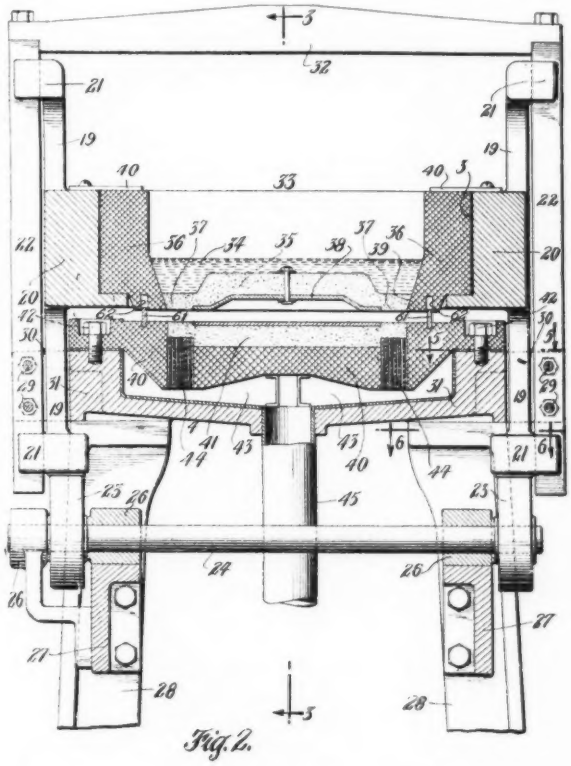


the invention is diagrammatically illustrated in Fig. 1. In the figure, the fabric 1 enters the tension rolls 2, passes between the platen 3 and the bed plate 4 which are shown in their separated position, and out through the driven rolls 5. It will be noted that the rolls 5 are provided with roughened surfaces such as a series of sharp projections to insure a firm and positive grip on the fabric. After passing through the rolls 5 the fabric is caught in a series of loops by the prongs or projections 6 extending from the conveyer belt 7. The conveyer belt is driven by the chain 8 from the sprocket 9, the operation of which will be hereinafter fully described. The speed of the said conveyer belt is timed so that exactly one minute elapses from the time the fabric leaves the rolls 5 until it is deposited in the bath 10. The rolls 11 which pass the fabric from the conveyer to the bath may be actuated in any desired manner. There must, of course, be time to take up the fabric at the proper speed. The baths 10 and 11', as shown in Fig. 1, are connected by the pipe 12, a continuous current of water or of an alkaline solution passing from inlet pipe 13 through bath 11', through pipe 12 into bath 10 and into outlet pipe 14. It may be found desirable to separate baths 10 and 11' and to use running water in bath 10 and an alkaline solution—for example, ammonium hydroxide—in bath 11'. Rolls 15 and 16 may be driven from the same source as rolls 11. Rolls 17 are heated and the fabric dries on passing through them. Any other suitable drying means may be employed if desired. It may be found desirable to heat also rolls 16 in order to insure the thorough drying of the treated fabric.

The drain 18 is lead-lined and is intended to catch any acid that may drip from the fabric as it is passing to the baths.

As before stated, the platen is so constructed that it may be raised or lowered. The arms 19 (Fig. 2) are cast integral with or, if desired, bolted to the metal frame 20 of the platen and are provided with ears 21 which slide on the guide rails 22. The two arms 19, which extend downward from the platen, rest on the cams 23. These cams are fastened to shaft 24, which is driven by a motor. The shaft 24 turns in the bearings 26, which are supported by L beams 27, said L beams running the length of the machine and being bolted to the legs 28. The guide rails 22 are secured with bolts 29 to ears 30 extending from the metal cross-piece 31.

The plate 3 has a removable inner portion 33 (Fig. 2) in which is contained the acid solution 34. This removable portion is made up of a pervious portion 35 and a portion 36 of cast lead or other suitable impervious material. The pervious portion is made up of a hard porous substance which is not affected by sulphuric acid and which has a sufficient degree of porosity to allow the acid to flow through it when suction is applied to its under surface, and which will retain the acid without leakage when the suction is removed. Materials such as white sand (silica) mixed with a suitable binder—for example, kaolin—and baked in the desired shape will give good results. It is found, however, that "alundum" (aluminum oxide with a silicate binder) gives the best results and is preferred red rather than white sand. The degree of porosity of the alundum may vary, depending on the solution used and also on the amount of suction available. Alundum is preferred, which will allow sulphuric acid (75 per cent by weight) to pass throughly freely under a difference in pressure of about 45 to 50 cm. of mercury. The narrow portions 37 are those through which the acid flows when



suction is applied. The remaining portion of the lower surface of the pervious material or ceramic is covered by the plate 38, which acts both as a covering to prevent acid from passing through and also as a supporting member. The narrow portion 37 follows the outline of the fabric, so that when the acid is drawn through the fabric the treatment will be limited to the narrow zone 37 describing the outline.

It may be found desirable to place a coloring matter in the acid solution so as to define sharply the portion of the fabric which has been treated. This would facilitate the subsequent cuting. Such coloring matter, however, should be of a type which will be completely taken out in the laundering or bleaching process.

The terms and expressions employed are used as terms of description and not of limitation, with no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described, or portions thereof; various modifications are possible within the scope of the invention claimed.

GRASSELLI WINS SUIT

An order to cease and desist ended the patent suit brought by the Grasselli Chemical Company against the Commonwealth Chemical Company, of Brooklyn, in the United States District Court. The final verdict established the Grasselli Company as "the sole and exclusive owners" of the six dye patents involved. These patents were purchased by the Grasselli Chemical Company from a firm who had bought the rights from the Alien Property Custodian. In the suit the Grasselli Company charged "that the defendant, Commonwealth Color & Chemical Company, of Brooklyn, has infringed upon the claims of each of said Letters Patent by selling or causing to be sold, and using or causing to be used, dyestuffs embodying the improvements and inventions claimed in said patents." There were several interesting features of the case involving questions of importation from Germany of colors, covered by the patents, and counsel for the plaintiff were aided in their evidence by investigation both in this country and Germany.

The Finishing of Pure Silk Raincoat Material

Plate Singeing Practice—Degumming Process—Dyeing the Fabric—Mixture of Dyestuffs—Dyeing Process

By HUGO NETTLEHORST

(*Textilberichte*, 1923, 178-179)

Translated by Ismar Ginsberg, B.Sc., Chem. Eng.

IN general, raincoat fabrics are distinguished from one another, when made from spun silk, by the fact that either the warp and shot are both made from silk or the shot is made of silk and the warp of other fiber. In both cases, before the material can be dyed it must be very carefully and thoroughly singed; otherwise the finished fabric will have a fuzzy appearance and, in fact, look unfinished.

The singeing operation is carried out either by means of gas or by passing the fabric over a heated plate. In the case of the first-mentioned fabric, gas machines are more advantageous. These are provided with winding devices and reversing gear. A machine which is equipped in this manner can be used to singe one side or the other of the fabric more than once by simply pressing a lever and reversing the motion of the machine. The cloth is passed through the gas singeing machine as many times as is required to remove the fuzzy appearance of the fabric. Then the surface of the same will be perfectly clean and smooth. The fabric is then reversed and the other side is given one or two treatments in the singeing machine.

When a plate singer is used, it is important that the plate be made from copper. Iron plates easily form grooves or depressed portions, and as the slightest unevenness in the plates causes considerable injury to to the fabric that is passed over it, it is impracticable to use them. It is also generally more advisable to use wooden drums in place of the wooden reels that are commonly employed for winding up the goods. It is then possible to wind up the goods on these wooden drums so that all creases and folds are removed. This can be done with lengths of fabric reaching up to 1,000 feet as a maximum. The fabric is generally given two treatments on the right side in the plate singer and one treatment on the left side.

Plate Singeing Practice

Singeing the fabric in a plate singer requires considerable experience and skill on the part of the operator who runs the machine. But, on the other hand, it repays the operator for his trouble, for when it is properly carried out it gives a smooth, clean surface. When the raincoat material is well singed and the surface of the fabric is perfectly smooth and correct in

every way, it may be said that half of the difficulties of the finishing of the fabric have been overcome.

The Degumming Process

The next treatment to which the goods are subjected when they are woven from silk, especially when the silk is of first quality, is degumming. The process may be carried out on machines especially constructed for this purpose, or the material can be degummed in accordance with its quality by treatment with soda and Marseilles soap, or with soda alone. Then the material is washed in a jigger in hot water and finally given a treatment in a bath of warm water acidified with sulphuric acid. It may also be treated in the wide degumming machine by being subjected to the action of hot caustic soda lye of low concentration to which a little Turkey red oil or glycerine has been added. It is then washed in cold water and finally given a treatment with hot water acidified with sulphuric acid. In each case after the acid treatment the goods must again be well washed.

Fabrics containing both silk and other fibers are generally not given a degumming treatment, but directly after being singed they are put into a jigger and treated with a warm solution of sal ammoniac. Then they are gently washed and given a treatment with a weak solution of soda, and finally well washed again. When the treatment is carried out in this manner a fabric is obtained with a good luster, the proper feel and the desirable "changeable," glassy appearance. The variation in the color of the finished fabric after it is dyed is due to the fact that all the dyestuffs that are used for this purpose color part of the fabric more deeply than the rest.

Dyeing the Fabric

The shades that appear to be in greatest demand are marine blue in all kinds of tints, Russian green, dark brown, dark lilac, wine red, bronze, gray, copper and black. The colors must be fast to washing, to light, and very fast to perspiration. Various classes of dyestuffs seem to meet these requirements, such as the alphanol series of dyes, the sulphon dyestuffs and various substantive colors, after they are diazotized and developed. The color is tested for its fastness to washing by allowing a small sample of it to remain in a definite amount of distilled water for a period of twenty-four hours. The water must remain colorless, or at the very maximum it must be only slighty tinted with the dye. Bright colors are obtained with the water-fast, light-fast and perspiration-fast substantive coloring matters without diazotization and after-treatment. Then, again, the alphonal dyes are sometimes mixed with sulphon dyes, or sulphon dyes are mixed with alizarine dyestuffs with good results. Similarly, alphanol dyes can be mixed with diamine fast colors and many different shades and color tones can be obtained in this manner. Examples of color mixtures are cited below.

Mixture of Dyestuffs

Marine Blue—In order to obtain this shade the following mixtures may be employed: Alphanol Blue GN with Alphanol Black KWAN or BG; Sulphoncyanin 5R Extra with Sulphoncyanin Black B; Sulphocyanin GR Extra with Alphanol Black KWAN, which is then tinted with Alizarincyan Green G Extra. Then, again, Diaminogen Blue 2B is mixed with Diaminogen B, then diazotized and developed with betanaphthol; Diaoindigo Blue BR Extra is mixed with Diaoindigo Blue 4GL Extra and Diazo Fast Black SD, then diazotized and developed with betanaphthol.

Russian Green—Diamin Green B and Diamin Black Green N are mixed together and while in the state of a boil are treated with fluoride of chromium, or Diazo Light Green BL. The colors are diazotized and developed with betanaphthol. Then, again, Alizarine Cyanin Green G Extra is mixed with Sulphoncyanin Black B or Alphanol Black KWAN or BG.

Dark Brown—Alphanol Brown B is mixed with Alphanol Black KWAN and Anthracene Yellow C, or Diazobrown B, and is then tinted with Diazobrilliant Orange BG Extra, diazotized and developed with betanaphthol.

Dark Lilac—This color is produced by mixing together Diazo Light Violet 3RL and Diaminogen Blue NA. The color mixtur eis diazotized and developed with the aid of betanaphthol. A very bright lilac is obtained by using Diamin Fast Violet BBN in conjunction with Alphanol Blue BR Extra.

Wine Red—This color is obtained by mixing together Diazo Rubin B and Diazo Light Violet 3RL or Diazobrown 3RB. Hhe mixture is diazotized and developed with the aid of betanaphthol. Or else Diamin Fast Violet FFBN is used and tinted with Diamin Fast Violet FFBN and Alphanol Blue BR Extra.

Bronze and Gray—These colors are obtained by using Diaminogen B or Diamin Fast Black X with Diamin Fast Yellow B and Diamin Fast Brown G, or by mixing Benzo Fast Black L with Benzo Fast Yellow 5GL and Benzo Fast Brown RL.

Copper—A copper color is obtained by mixing Diazo Brown 3RB with Diazo Light Red 7BL. The mixture is then diazotized and developed with betanaphthol.

Black—Various blacks can be obtained from various grades of Alphanol Black or Sulphocyanin Black B. These colors are shaded with the aid of Sulphon Yellow R, or Diaminogen B with the addition of a small proportion of Naphthylamine Black 4B. The colors are diazotized and developed with rescorcin and diamin in a mixture of three of the resorcin to one of the diamin.

THE DYEING PROCESS

The dyeing of the raincoat fabrics is carried out in a jigger. When alphanol and sulphon dyestuffs are employed, a little ammonium acetate is added and the dyeing is commenced at an initial temperature of 60 deg. Cent. Then the proper amount of acetic acid is added and the dyeing is continued at a temperature at which the dye solution boils. In dyeing with both these classes of dyestuff it is advisable to add a little Glauber salt. When substantive dyestuffs are used alone or in combination with alphanol or sulphon colors, it is well to add both sodium sulphate and acetic acid to the dye bath and to commence the dyeing at a temperature of 60 deg. Cent. and finish the process at a boiling temperature. After the goods have been dyed, they are well washed. They are sometimes well soaped in a solution of Marseilles soap at a temperature varying between 60 and 80 deg. Cent. The goods are then washed with warm water and given an acid treatment by passing them through a water bath, slightly acidified with sulphuric acid and maintained at a temperature of from 40 to 50 deg. Cent. The goods are again well washed and the water removed by centrifuging or placing in a suction box. They are then stretched on tension frames and dried to full width.

THE 1924 PAPER SHOW

The Paper Industries Exposition has reserved the entire first floor of the Grand Central Palace for its 1924 exhibition, and has made tentative reservation of the mezzanine floor in addition, if the number of exhibitors warrants this expansion of the paper show which will be held the week beginning April 7.

The success of the first exposition held in April, 1923, was such that the change to first-floor space, with its greater facilities for showing and viewing exhibits, was justified. Already there have been contracts for space received from the 123 of those who exhibited in the 1923 exhibition, so the exposition can now be considered as an annual event in the paper industry.

The attendance at the 1923 exposition was surprisingly large, there being 63,155 in attendance, and this in spite of the fact that it was the first paper show of national extent ever to be held in the United States.

The attendance at the 1923 exposition was surprisingly distributed between technical men, superintendents, plant executives, jobbers, printers and the general public interested in the story of paper. The second show, with more exhibits and an even greater variety, will undoubtedly attract even greater attention than the first "Paper Show," as it came to be generally known.

NEW NEWPORT PRODUCTS

The Newport Chemical Works, Inc., of Passaic, N. J., have just announced that they are now producing Newport Direct Fast Scarlet 4BA. The foreign-made color using the same designation is probably so well known that comments on the characteristics of this color are hardly necessary, so it suffices to say that the company claims it identical in every way. The fact that this is one of the few products that will dye cotton and leave silk white in a bath and then discharge to a pure white is its most distinguishing feature.

In addition to the above this company announced the production of a product identical with Erika B Extra and Erika BN, and they now further announce that it has been decided to market these products under the following names which conform to their regular nomenclature: Newport Direct Fast Pink EBN identical with Erika BN, Newport Direct Fast Pink EB Extra identical with Erika B Extra. The domestic production of this product is a distinct achievement and the welcome accorded it by the textile trade must be gratifying as the product was not produced without arduous research and great expense.

"The Calco Chemical Company has had prepared in their Leather Application Laboratories, shade cards showing the spring colors for 1924 as selected by the Tanner's Council in conjunction with the National Color Card Association.

The shades are shown on chrome tanned calf, goat and sueded stock, and show to very good advantage, the results which may be obtained through the use of Calco dyestuffs.

The company is equipped to do consulting work for the tanneries and will be very glad to receive inquiries from such plants as are interested.

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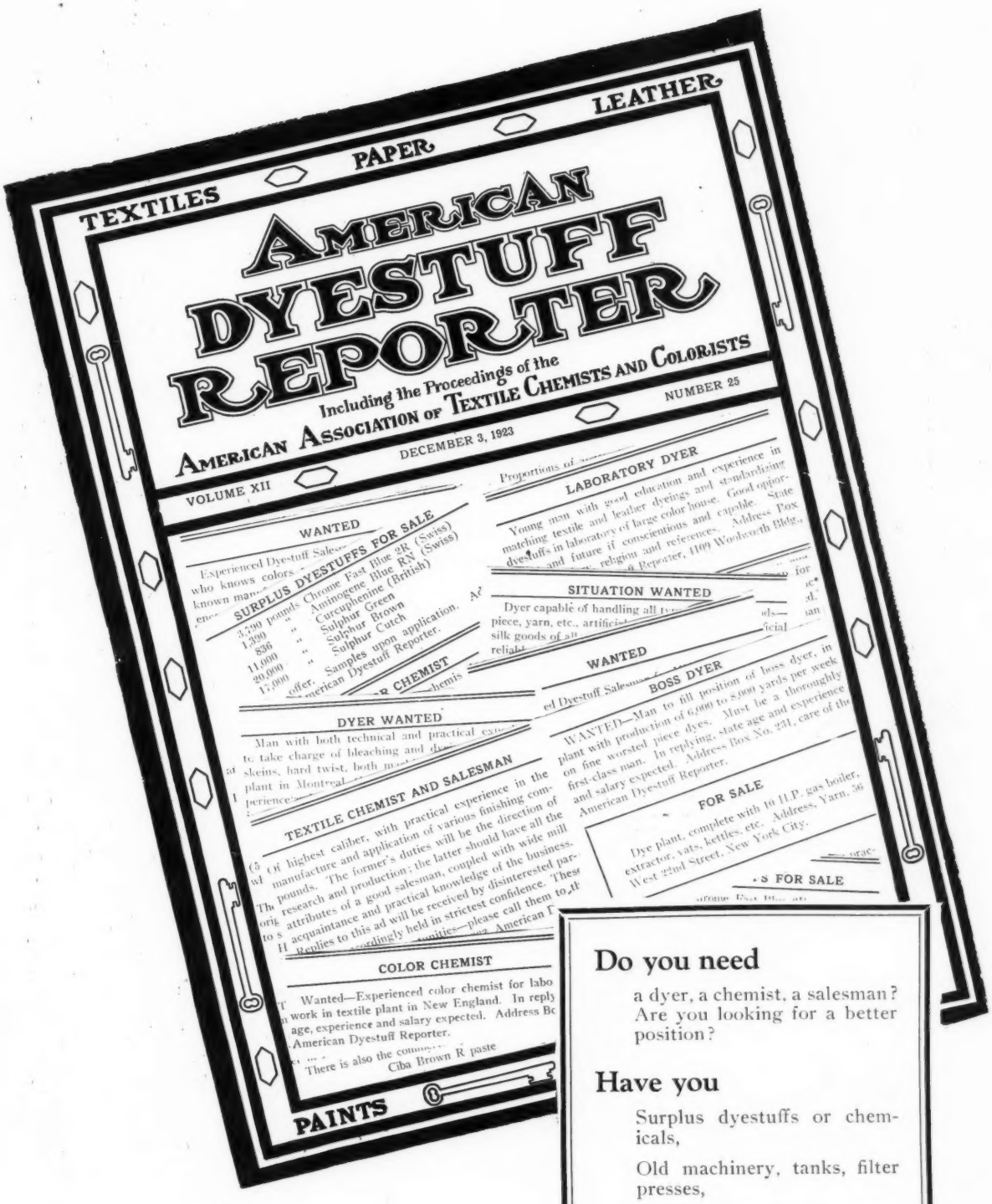

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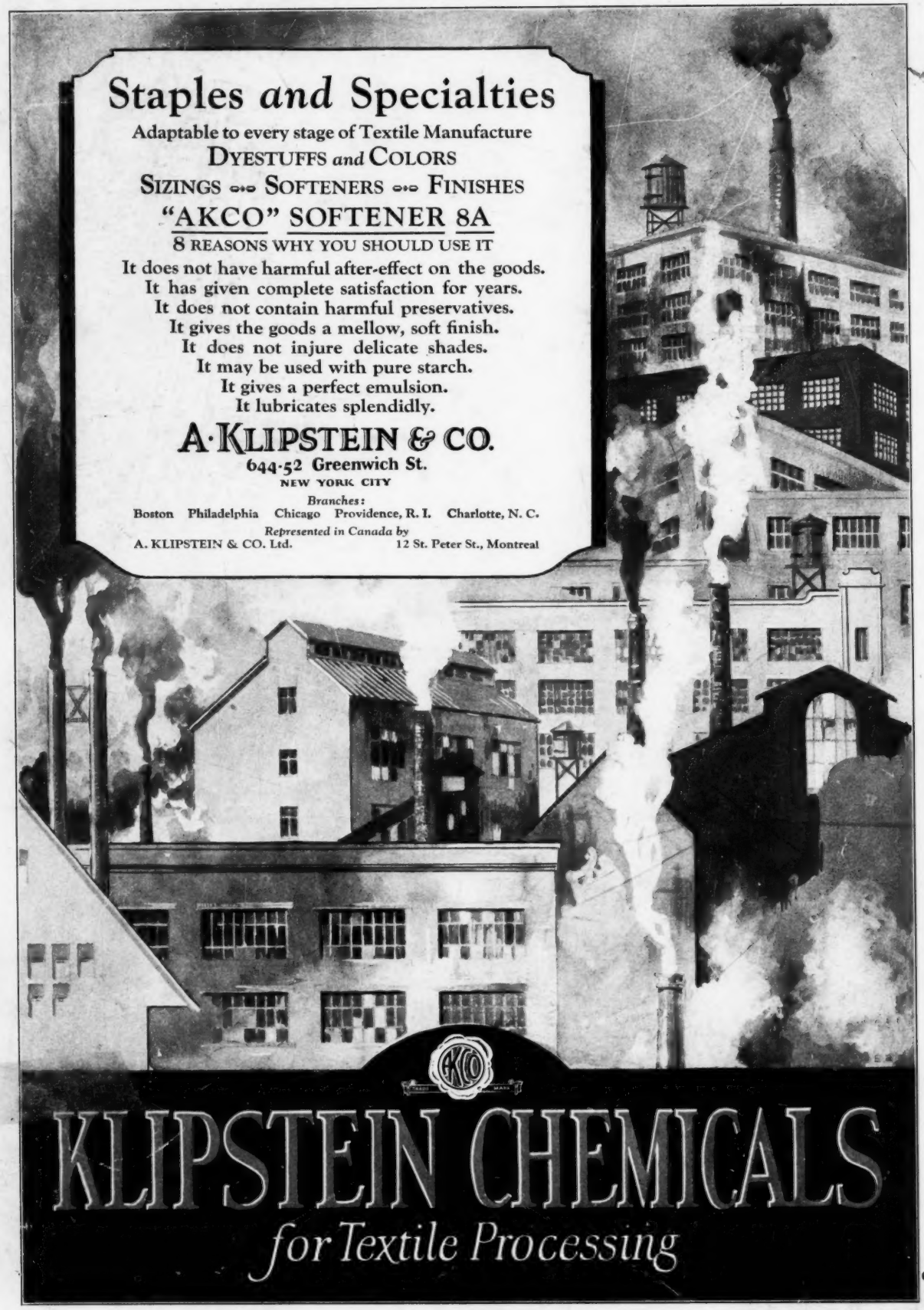

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